

THE IRON AGE

New York, September 30, 1915

ESTABLISHED 1855

VOL. 96: No. 14

Reducing the Fire Hazard in a Factory

Precautions Observed by A. B. Farquhar & Co. Include Weekly Sprinkler System Inspections and a Daily One of the Entire Plant

BY H. A. RUSSELL

It is easier and better to reduce the chances of fire inside the factory than to fight it later, but it is also wise to be in a position to combat the blaze without delay. The first few minutes are the ones that count the most in favor of the factory fire department. After that period of time, if the blaze is not under control, the city department will have its hose lines connected up and be ready to take charge. The factory fire-fighting appliances should be so connected and installed that the minimum amount of time will be lost by whoever discovers the blaze. The hose lines and extinguishers should be so located and their location indicated clearly by stenciled signs or arrows or distinctive colors that the average person can readily find them. And by the "average person" is meant not only the members of the factory fire department, but also the other employees, who would naturally not be as familiar with the location of the fire-fighting equipment.

In shaping up our volunteer factory fire department we received valuable advice from a number of our own men, who were, or had been, members of our city volunteer department. The various buildings have been protected by an automatic sprinkler system for some years past, and extinguishers and water barrels were located in the various departments, but each departmental foreman was supposed to have one of his men look after the fire-fighting equipment in his department. This meant a more or less casual knowledge of the location of the hose lines, extinguishers, etc., by all of the employees in each department except the one man who was supposed to look after the equipment from time to time, but not at stated intervals.

Now, under our present method we have regular inspections by all of the members, twenty-one in all. They start in at a certain point and pass from department to department and from floor to floor. This familiarizes every man in the shop fire depart-

ment with the location of every piece of equipment over the entire factory and promotes a spirit of friendly rivalry between the different departments. If a member from one department can pick a flaw in the equipment or location of equipment in another department he does it; sometimes gently, other times not.

The entire sprinkler system is in charge of one man, whose duty it is to make weekly inspections and reports. Should this man be absent for any reason there are two others who can be used as substitutes, having been instructed along the same

lines, and further, the watchmen are familiar with this equipment and carry a key to all sprinkler riser boxes. All of these riser boxes are master keyed, duplicates being given to watchmen and foremen, and a duplicate is also kept in the office key cabinet, properly tagged. The weekly report illustrated is filled in jointly by the sprinkler system inspector and the fire chief and filed in the office for reference.

The fire department is composed of twenty-one members. A folder was printed containing the rules and a list of the different offices. Several of these offices have been combined; for instance, the secretary and treas-

urer are the same. Each member was given a regular fireman's badge. If there should be a fire in the plant and the city firemen took charge these badges will permit our own firemen joining in and assisting the city firemen. This is a big feature, because naturally our own men know the location of all the equipment, fire escapes, stairways, etc., and would consequently save valuable time by guiding the city firemen to the desired location more promptly than they would get there if left to themselves. The shop firemen meet every three months and the minutes of the preceding meeting are read. The members then discuss such improvements as have been made or should be made. Their



The Chemical Engine in Its House. The special door-opening mechanism can be seen, the operating ring on the outside showing through the glass

recommendations are then incorporated in a written report and sent to the main office. Inspections are made monthly by the entire department. The fire chief makes a detailed report each month, showing what has been accomplished and making such suggestions as may improve the value of the equipment or the efficiency of the department.

We have done away with stationary hose reels, and use the swinging rack instead. Practically all of the hose is 1½ in. in diameter, for one-man use. The hose is never disconnected from the standpipe. Between the valve on the pipe and the hose connection is a pipe nipple, and in the nipple is a drain cock, which is left open except when the valve is open. This prevents the hose rotting at the connection. The hose racks are of the type which permits the opening of the valve without the water entering more than a few feet of the hose. The fireman then pulls the hose off the rack, and when the last lap is about to fall off the water passes through and out the nozzle. This means that the operator is ready to direct the stream of water as it emerges from the nozzle. All hose racks have been so located that the stream of water from any hose will protect the floor space at the rack on either side. For instance, if a fire started in a department close to a hose rack and in such a position that that hose could not be used, the next rack is so placed that the stream of water from the hose will cover the floor space surrounding the spot where the fire would be.

Two kinds of extinguishers are used, the first being of a type suitable for burning materials of various kinds and the second type for oil fires or around electrical equipment. Water barrels are located at advantageous points, also kegs of sand. All water barrels and buckets have wide blue and red bands around them. These colors attract the eye. We have found that a combination of colors was better than a single one. In certain lights the effect of blue is better than the red, and vice versa. At a number of prominent places in factory we have boards projecting out overhead, painted red and lettered in white with the words, "Hose," "Extinguisher," etc.

In front of all elevator openings we have suspended hinged doors, held up by ropes connected to 165 deg. fusible links. All doors at heads of stairs are suspended in the same manner. Access to all roofs is furnished by inside and outside stationary ladders. Where two adjoining roofs are not on the same level stationary ladders are placed in position so that rapid progress can be made from one roof to the other. Near the center of the plant, along one of the cross alleys, a large extension ladder is kept outside at all times, for second or third-story work. We have made it an absolute rule that no fire department apparatus or equipment can be used, even temporarily, for other than to overcome fires; this, of course, excludes necessary testing. Doors between buildings are built according to underwriters' requirements and held back by fusible links during the working hours and closed at night. The watchmen carry at all times a small-sized extinguisher of the pump type, suspended from the shoulder by a strap and held by a leather pocket.

At a number of places throughout the various buildings ropes are kept coiled up near certain windows on all floors. This permits quick action in getting additional hose from the lower floors when needed, and will not interfere with employees passing down stairways or fire escapes. One end of the rope is fastened securely.

A 40-gal. chemical engine on two wheels is part of the equipment. This is complete with 100 ft. of

Weekly Sprinkler System and Fire Inspection Report

1. Valves at Sprinkler Risers:
Each riser valve to be inspected by turning valve one-half turn to insure its being well seated and working order. Drop valves and air valves to be inspected in similar manner.

Riser	No.	Dept.	Location	Inspected
No. 1	Dept. 1	S. E. River		OK
" 2	" 2	N. E. "		
" 3	" 3	N. W. "		
" 4	" 4	S. W. "		
" 5	" 5	S. Mill "		
" 6	" 6	100 S. Mill "		
" 7	" 7	111 S. Mill "		
" 8	" 8	14 N. E. River "		
" 9	" 9	14 N. W. "		
" 10	" 10	S. W. "		
" 11	" 11	S. E. "		
No. 12	Dept. 12	(See) River		OK
" 13	" 13	" 17, at boiler		
" 14	" 14	" 17, at Range fire		
" 15	" 15	" 17, S. mill		
" 16	" 16	Wybrouse at lg. elev.		
" 17	" 17	" " " "		
" 18	" 18	" " " "		
" 19	Dept. 19	Beam Store's bldg.		
" 20	" 20	and 21, Fly. double rise		
" 21	" 21	Fly. west side River		

2. Valves—Post Indicator Gate Valves.
These are fitted for uniform wrench, and are to be inspected the same as inside valves, by turning valve partly around.
(Note: These valves are all regular right hand valves, closing clockwise.)

Valve No. 1, Boiler Shop: Located in Court Alley at Stable OK
 " 2, For Smith Shop: In Court Alley at Welding Building OK
 " 3, For Warehouse: Located in Gap Alley OK
 " 4, For Carpenter Department: Located in Gap Alley at Boiler House OK
 " 5, For Smith Department: In Gap Alley at Carpenter Department Main Entrance OK
 " 6, For Foundry: Located in Scrap Iron Yard OK
 " 7, For Machine Shop: Located in Foundry Scrap Yard Scrap pile, too close
 " 8, For Machine Shop: Located opposite South Foundry Door OK

3. Under this head give explanation as to risers or valves found closed or out of order in any way since last inspection.
Had reported Valve #7 to Mr. Lipe

4. Note here number of systems into which water entered since last inspection from low air pressure or other cause, giving explanation.
Had trouble with Riser #15. Slow leak. Has been remedied.

5. Note here alarm devices out of order, by sprinkler riser number, giving explanation.
None

(OVER)

Front of the Weekly Sprinkler System and Fire Inspection Report Blank

hose. Passageways through the plant are kept open, so that no time will be lost in placing the engine at the point nearest the blaze. This engine is housed near the center of the plant, facing on the principal cross alley. The house is of concrete and brick construction and has a steam radiator for use in winter time to prevent the chemicals freezing. The house also contains extra axes, crowbars, lanterns, etc. The door is not locked at any time, but to prevent children from entering, we fastened a light wire cable to the inside drop bar and passed the cable through the top of the door, keeping it in place by a ring. This ring is too high for children to reach, but a slight pull on it will lift the bar and open the door. Therefore no time is lost in hunting for a key, nor need any one worry about having one at hand. In a surprise test a short time ago one man hauled the engine approximately 300 ft. and had the steam going in 53 sec. This chemical man is located, when at his regular work, within a short distance of the engine house.

We do not detach hose when testing it. This assures us that that particular water supply is in

NOTICE FROM FIRE CHIEF

TO FOREMAN DEPT. NO. 10 DATED 7/21 1915

Please have the following, in your department attended to at once:
Partition between Carpenter Shop & Wheel Room is too flimsy. Please replace with heavier material and cover both sides with plate iron.

Approved: FF FOR THE MANAGEMENT
 Above attended to: July 24

A. Cameron
FIRE CHIEF

(1915)

C. A. S.
FOREMAN

(1915)

Please return this Notice to Fire Chief's Desk when Completed.

Prerequisite in completing Notice with a receipt

Notice Sent to Department Foremen Regarding Unsatisfactory Conditions

made the form is signed by the foreman and returned to the fire chief.

Iron doors are suspended by fusible links in front of all dip tanks. From these tanks, leading to the outside air are stacks of suitable size, with dampers. In each of the tanks is a live steam line, so as to smother the flame when necessary. The valve for any one tank is located at the next tank; this does away with the chance of being unable to open any of the valves. All naphtha tanks are underground, the material being pumped to the point required. All dipping tank doors have a small punched hole, over which a small lid usually hangs. These holes are for the tip of a fire extinguisher, so that the liquid can be discharged without danger to the operator.

Throughout the entire factory we have placed framed notices in conspicuous places, near the entrance to each department, at the heads of stairways, etc. The copy of the notice shown is in the four-story warehouse. Immediately above these notices we put a sign which indicates that floor. For instance on the ground floor, over the framed notice, will be a sign "First Floor." This was done so as to overcome any chance of confusion, in the event of any one outside of the regular fire force discovering a blaze and in the excitement forgetting what floor he was on, and we also wanted all of the necessary information for all floors on each of the notices. We also have another set of framed notices, which are printed in red ink, and which read as follows:

FIRE NOTICE

For Plants Equipped with Automatic Sprinklers
Please Read and Become Familiar with This.
What to Do in Case of Fire.

This notice gives the number of the nearest fire alarm box and instructions as to closing of doors and windows and shutting off the gas cocks, the location of which are given. Each gas cock has a handle fastened permanently to it, which overcomes the chance of losing time hunting for a suitable handle, such as a wrench.

We are constantly on the alert to prevent any chances of a fire, and keep the equipment and the shop fire department up to date. A good firemen's magazine is subscribed for and read by a majority of the members. Inspection is made periodically of all cupboards, under benches, in the various cellars and on all the roofs.

German Pig Iron at High Mark for War Time

Germany's pig-iron production for July, according to official data in *Stahl und Eisen* of Sept. 2, 1915, was 1,064,899 metric tons as compared with 989,877 tons in June, 1915. This is the largest monthly output since the war started and is at the rate of 34,351 tons per day, the best previous rate during the war being 31,805 tons for June. The output in July, 1914, was 1,561,944 tons. The output for July, this year, was made up of 216,477 tons of foundry iron, 16,772 tons of Bessemer iron, 654,479 tons of basic or Thomas iron, 158,029 tons of steel-making iron and spiegeleisen and 19,142 tons of puddle iron. The output for the first seven months of 1915 is 6,599,236 tons against 10,850,140 tons to Aug. 1, 1914.

The United States furnished 14.2 per cent of the total imports, exclusive of specie and government stores, into the Union of South Africa, in the first half of 1915, against 9.3 per cent in the same period in 1914, according to *Commerce Reports*.

1. Sprinkler System

No. _____ Warehouse _____ *OK*
 No. _____ Carpenter Shop Main Building _____ *OK*
 No. _____ Carpenter Shop Saw Mill Building _____ *OK*

Note: No. _____ (Number full of water at test, and in winter whether cocks are frozen, and whether the test was made in winter)

Automatic Sprinkler System

Has been tested in these in any of the systems, giving location. (Sprinklers must not be corroded, and workable, whether painted, or obstructed by clothing, partitions, etc.) Report as to this.

Sprinkler Heads on Sept. 16 are starting to corrode. Have replaced some of these and will finish changing the balance today.

2. Fire Pails and Casks

Is Pail _____ Full _____ *Yes*

3. Fire Extinguishers

Is Pail _____ Full _____ *Yes* Date tested and charged: *April 15th 1915*

4. Fire Doors

Have been tested and locked nights, Sundays and holidays, and at all times when not in use. Note whether they are in good order. *Yes* whether they need any repairs. *No* and whether automatic extinguishers are in place. *Yes*

5. Stand Pipes and Hose

Is in Pail _____ In good Order _____ *Yes*

6. Stairways and Steel Doors and Traps

Is in Pail _____ In good Order _____ *Yes*

7. Cleanliness in General

Is in Pail _____ In good Order _____ *Yes, Sept. 18. Notified foreman.*

8. Underground System

Has been tested in these in any of the systems, giving location. (Sprinklers must not be corroded, and workable, whether painted, or obstructed by clothing, partitions, etc.) Report as to this.

9. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

10. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

11. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

12. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

13. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

14. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

15. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

16. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

17. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

18. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

19. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

20. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

21. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

22. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

23. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

24. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

25. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

26. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

27. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

28. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

29. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

30. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

31. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

32. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

33. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

34. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

35. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

36. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

37. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

38. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

39. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

40. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

41. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

42. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

43. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

44. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

45. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

46. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

47. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

48. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

49. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

50. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

51. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

52. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

53. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

54. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

55. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

56. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

57. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

58. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

59. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

60. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

61. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

62. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

63. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

64. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

65. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

66. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

67. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

68. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

69. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

70. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

71. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

72. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

73. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

74. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

75. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

76. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

77. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

78. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

79. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

80. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

81. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

82. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

83. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

84. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

85. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

86. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

87. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

88. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

89. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

90. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

91. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

92. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

93. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

94. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

95. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

96. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

97. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

98. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

99. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

100. Fire Alarm Box

Is in Pail _____ In good Order _____ *OK*

Reverse Side of the Sprinkler Inspection Report Blank

good order. In some factories this may not be feasible, in which case the water supply should be tested in some other manner.

The fire chief, who is also the foreman painter, makes one complete trip over the factory each day. As his regular duties as foreman would take him into a majority of the departments daily, the extra time involved is very small. He also reports such other matters as may come under his observation, such as a leak in a roof, broken window glass, etc. Where he finds something to be remedied he fills in the "Notice from Fire Chief" form, which is first sent to the main office to be approved, then to the proper foreman, and when the change has been

WAREHOUSE NOTICE FIRST FLOOR

If fire should break out in this building.

Fire hose can be found on wall at bottom of steps.
 Fire hose at small elevator.
 Water barrel alongside of riser close to large elevator.
 Water barrel at post at door next to engine room.

SECOND FLOOR

Fire hose on post close to large elevator.
 Fire hose at small elevator.
 Water barrel alongside of post in middle of floor.
 Fire extinguisher close to large elevator.
 Water barrel at post alongside of post close to large elevator.

THIRD FLOOR

Fire hose can be found at head of steps.
 Fire hose can be found close to small elevator.
 Water barrel alongside of post close to large elevator.
 Water barrel alongside of post in middle of floor.
 Water barrel at door in front room.
 Fire extinguisher on post close to large elevator.
 Fire extinguisher hanging at meter at large elevator.
 Fire extinguisher on the south side close to the Union Engine House.

FOURTH FLOOR

Fire hose can be found at head of steps.
 Fire hose can be found close to small elevator.
 Water barrels both sides of the middle tiers, front room.
 Fire extinguisher both sides of the middle tiers.
 Fire extinguisher at door in front room.
 Fire extinguisher close to large elevator.
 Key for riser at warehouseman's stockroom.
 Close large valve when water is not needed.

Semi-Automatic Four-Spindle Drill Press

A semi-automatic four-spindle ball-bearing drilling machine for drilling the four clearance holes in threading dies and similar work is being placed on the market by Edgar W. Bemis, Worcester, Mass.

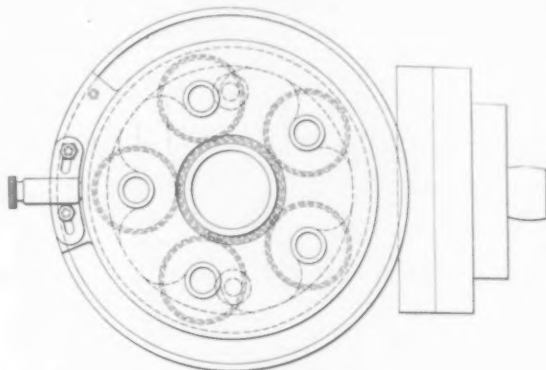
The work table has five chucks so that one chuck is open to the operator for placing and removing work, while the four drills are in operation. This semi-continuous method of operation is the distinctive feature of the machine in connection with its capacity to bore holes in a circle of small diameter with one setting of the work.

In operation the piece to be drilled is placed in the chuck on the front of the table, then the lock pin is drawn and the table is revolved to the first spindle. While the table is rising and the first piece is being drilled, the operator is placing the second piece in the next chuck. The machine has a rated capacity of 1800 threading dies, 5/16 in. thick, per day. The lock pin, which locks the work table to the lifting table, can be so located by a simple attachment as to allow the chuck center to be moved from the center of the drill. On the size of machine illustrated, this permits drilling four holes in any circle up to 3½ in. in diameter.

The work table is supported on ball bearings on the lifting table, which moves up and down to feed the drills into the work. The lifting table is sustained by lifting rods, located under opposite sides of the table, which travel on rolls on cams fastened to a worm gear, which revolves around the post, being driven by gears on the main driving shaft. The worm gear and lifting cams rest on ½-in. balls. The contour of the lifting cams governs the depth

of work which can be drilled. Small hand wheels on the threaded portion of the lifting rods are employed to adjust the table to the drills. A handle conveniently placed on the side operates a sliding clutch on the worm shaft for stopping and starting the feed.

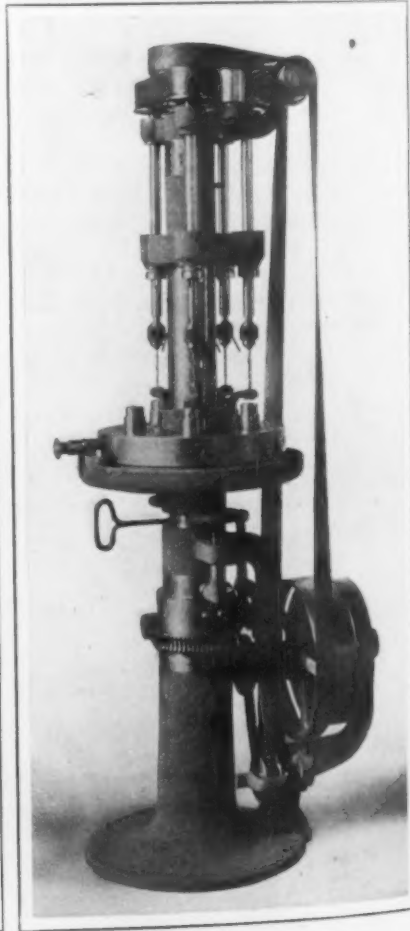
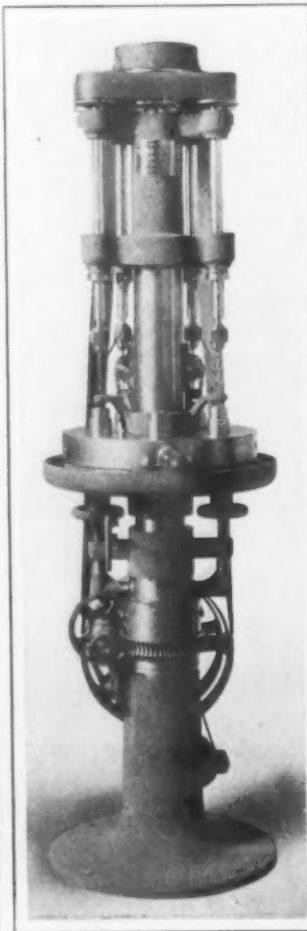
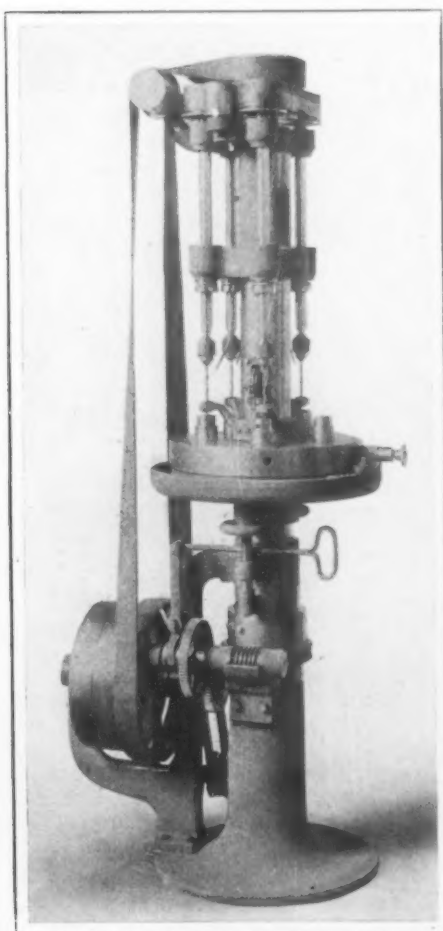
The chucks are mounted on work spindles which have keyed to them gears meshing with a gear



As the Table Is Rotated, Gears Index the Work to the Proper Position for Drilling

fastened to the hub of the lifting table. As the work table is rotated to bring the piece successively under each drill, these spindle gears index the work to the proper position for drilling. The shank of the chuck is drilled halfway through its length so that the drill can be put up on the shank, then adjusted to the proper position.

A stud in the top of the post supports a cone



The Table Rises Against the Drills, Drilling Four Pieces of Work Simultaneously; the Operator Inserts a Fifth Piece in the Inactive Chuck; the Table Returns to Its Lower Position, and Turns One-fifth of a Revolution and Also Turns Each Piece of Work So That One After the Other the Four Holes Required Are Drilled as the Piece Is Passed Around the Table

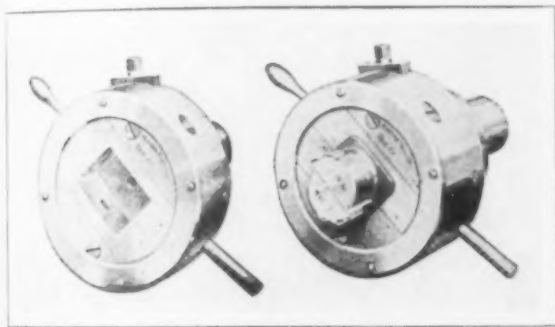
pulley, of which the top section receives over idlers a belt from the main driving pulley, the bottom section carrying an endless belt, which travels around the four pulleys on the drill spindles, the belt being kept tight by idlers on opposite sides of the post.

An oil chamber is cored around the head back of the spindle bearings and drip valves are tapped into it from which pipes carry the oil to each drill. A pump driven from the main shaft supplies the oil chamber.

A Collapsing Adjustable Shrapnel Tap

For finishing shrapnel and high explosive shells, the Modern Tool Company, Erie, Pa., has brought out a collapsible adjustable tap. The special feature about the tap, apart from its collapsing action, is an adjustment of 1/16 in. for producing tight or loose threads.

The cutting members consist of only two parts, the arrangement being practically identical with



A Collapsing Adjustable Tap for Threading Shrapnel Shells to Receive the Timing Fuse and Other Rapid Production Work with the Chasers Removed and in Place. The collapsing of the cutting members is secured by external cams and springs

that of a solid tap split through the center. As is the case with the solid tap, each blade has two or more flutes and the shank of each blade terminates in a square base that is fastened in similar holes in two slides by screws. These slides are carried in a T-shaped groove in the head proper and have a transverse movement, which causes the blades to slide past each other and provides for reducing or increasing the diameter of the cutting tools as circumstances may require.

Each sliding block has a curved surface at the outer end which is operated upon by the inclined cam surface on the inner surface of the ring that encircles the whole tap. The depth of these cams, it is pointed out, is sufficient to force the sliding blocks to move past each other enough to collapse the cutting blades and have the tap entirely clear of the work before it is withdrawn.

The head proper, which carries the sliding blocks and cam ring, is mounted on a shank to be clamped in the chuck or turret head in the usual way. If desired, it can be made rigid with the turret head or have a longitudinal float. The tap is made in four sizes ranging from 1/2 to 3 in. in diameter, but it is emphasized that as the operation of the tool is effected by cams and springs external to the cutting members, there are no delicate parts within the tap, making it possible to thread much smaller diameters if that is necessary.

The Standish Chain Mfg. Company has established a temporary factory in the buildings formerly occupied by the Seneca Chain Company, Kent, Ohio. The company expects to secure permanent quarters shortly.

Points on Hardening High Speed Screw Machine Tools

BY R. A. MILLHOLLAND*

Now that the price of high speed steel is soaring, it behooves the machine shops of the country to give serious thought to the conservation of their present supply. Much good steel is wasted every day through poor practice in heat treatment. A tool improperly hardened naturally has to be ground oftener than a properly hardened one, and the result is a serious loss in manufacturing time and a waste of perfectly good high speed steel.

All the up-to-date methods may be practised in the hardening, and yet the tool may prove unsatisfactory when run at the speed and feed that high-speed steel will stand when properly treated. Some of the most serious trouble has been experienced in the hardening of screw machine tools such as special shaped cutting-off tools, box-turning tools and facing tools—in fact any tool that is ground from the annealed bars as they are received from the mill, and have one of the cutting edges on one of the sides of the annealed bar. Especially is this true of the box-turning tool where generally little or nothing is ground from the face of the tool stock. Most of these tools are made from 1/2 x 1 in. stock and require no forging before they are ground on the emery wheel.

The practice of making stock-removing screw machine tools should not differ in any essential from the making of taps and the more delicate tools that are made in the tool room. What competent tool maker would think of making an expensive tool from a piece of stock that was just large enough to "clean up"? Did you ever stop to consider why the experienced tool maker always turns off at least 5 per cent of the diameter before attempting to make a tool that must have an enduring cutting edge? The theory is the same for large and small tools. The reason is that the annealed bars as received from the mill have a thin shell of decarbonized scale, so to speak, on the outside. This decarbonized area must be removed before a good cutting edge can be secured that will harden satisfactorily. A simple method for doing this is to grind the tool to its approximate shape and then put it in the milling machine and remove about 5 per cent of the thickness of the stock from the surface that is to be the cutting edge. If this is done, when the tool is properly hardened it will have its maximum cutting capacity and will run longer on fewer grindings than will the tool made from the rough stock without first removing the decarbonized area. The practice of disregarding the decarbonized area in all forms of tool steel has always been and always will be a great source of loss both in the efficiency of the tool and the cause of excessive tool steel bills.

The actual hardening of high speed steel is a comparatively simple matter, and if the tool is properly prepared for hardening there is little doubt that the result will be better than the average shop is now obtaining from the careless way that high-speed screw machine tools are made in a large number of plants.

The McMyler Interstate Company, Bedford, Ohio, has recently taken a number of orders for shipbuilding cranes for Eastern shipyards. Among these orders are cranes for the Government navy yard at Philadelphia and for the Cramp shipyard.

*Consulting metallurgist, Indianapolis, Ind.

MECHANICAL ENGINEERS MEET

San Francisco Gathering of the American Society of Mechanical Engineers

The Diesel engine received special attention at the meeting of the American Society of Mechanical Engineers, held in San Francisco on Sept. 16 and 17. There were two papers on the oil engine, one on the heavy oil engine, by A. H. Goldingham of the De La Vergne Machine Company, New York, and the other on the Diesel engine, by Prof. W. H. Adams, Throop College of Technology, Pasadena, Cal. There were also two papers having to do with the Panama-Pacific International Exposition and a paper on the strength of gear teeth, by Professors G. H. Marx and L. E. Cutter of Leland Stanford, Jr., University. There were two professional sessions held on the mornings of the two days, both in the hall of the Native Sons of the Golden West, Mason Street, near the Clift Hotel, which was the headquarters hotel for the meeting. There was also a special session on the exposition grounds when the society was given a bronze plaque by the exposition authorities.

F. W. Gay, mechanical engineer of the J. G. White Engineering Corporation, at San Francisco, as chairman of the San Francisco local committee, opened the meeting, and the ceremony comprised the welcoming address by Charles C. Moore, president of the exposition, and the response by Dr. John A. Brashear, president of the society. Mr. Moore testified to the debt the exposition owed to the engineering profession and paid a tribute to Dr. Brashear, who, as he mentioned, had been chosen by the governor of Pennsylvania, through a commission to make that selection "as the citizen of that State whose genius had contributed most to the general welfare of its inhabitants."

The remainder of the first session was given over to the two papers relating to the exposition. One of these was by Guy L. Bayley, chief mechanical and electrical engineer of the exposition company. This covered in detail some of the engineering features involved in building the exposition, such as those noted at length in an article in THE IRON AGE of Jan. 7, 1915, by Prof. E. P. Lesley of Leland Stanford, Jr., University, covering the hydraulic fills, the structural design of the main palaces, the sewerage system, the methods of transporting the materials of construction and the exhibits; the system of fire protection; the considerations surrounding the provision of power, heating, ventilation, pumping, crane service and the like; the gas distribution and water supply; the telephone system and also the electrical features.

ONE OF THE EXPOSITION ILLUMINATION DETAILS

While much has been said on the lighting features of the exposition, the care which had to be exercised in some details is indicated in the following paragraph taken from Mr. Bayley's paper, covering the illumination of the Court of the Universe by means of translucent columns, which in the daytime appear to be of marble. This court has "an area of 24,700 sq. ft. and is lighted from the columns on the two fountains. Each column is 30 ft. high, the outside being made of glass strips curved to represent the flutes of the column. In each column are ninety-six 1500-watt gas-filled lamps, the light from which is diffused by means of sandblasted glass screens placed between the lamps and the outer glass. A motor-driven fan is located in the base of each column and blows air through the column to prevent the lamps from overheating.

Provision is made so that in the event the air fails the lights will be turned off automatically."

The cost for electric service chargeable to illumination is \$630 per night, Mr. Bayley says, and for labor, repairs and maintenance \$125 per night. The lighting of the emergency gas lights costs about \$35 per night, and the gas lighting in the States and Foreign sites about \$40 per night. In round numbers the cost to the exposition for lighting is \$830 per night, which sum includes all operating costs but no capital charges.

MACHINE EXHIBITS AT THE EXPOSITION

The other paper dealing with the exposition was presented by George W. Dickie, who was chairman of the departmental jury of awards on tools for shaping wood and metal, but who is best remembered from his connection with the Union Iron Works, San Francisco, which built the battleship Oregon, famed in the Spanish-American war. Mr. Dickie's paper was, in a measure, an outline of what one may see at the exposition in certain branches of mechanical engineering, and in that respect is an enlargement of the list of exhibitors and their exhibits given in THE IRON AGE of July 15. As regards the machine-tool exhibits, he paid special attention to that of the Warner & Swasey Company, and mentioned favorably the exhibit of the Morton Mfg. Company. Special mention was also made of machines exhibited by Gould & Eberhardt, the Crane Company and the Landis Tool Company; by the Max Ams Machine Company and the E. W. Bliss Company in can-making machinery; by the Carborundum Company in respect to abrasive materials for cutting metal, and by the Davis-Bournonville Company in cutting metals by the gas torch. Special mention was also made of the exhibit of Henry Disston & Sons, for saws; of the sheet metal bending machinery of the Dreis & Krump Mfg. Company; of the tools for cutting external and internal threads shown by the Geometric Tool Company; of the hydraulic apparatus exhibited by the Hydraulic Press Mfg. Company, and of the hack, power and jig saws shown by the Henry G. Thompson & Sons Company; the power transmission machinery of the Dodge Mfg. Company, and the cranes and hoists of the Shepard Electric Crane & Hoist Company.

DIESEL AND SEMI-DIESEL ENGINES

Of the papers on the oil engine, Mr. Goldingham's divided present-day heavy oil engines into two classes, regardless of their cycles, as follows: Diesel and hot-surface or semi-Diesel. The important elements in the design of both, he said, are cylinder heads, trunk pistons or crossheads and shorter pistons and sprayers or pulverizers.

The thermal efficiency of the heavy oil engine, he continued, has during the last twenty-seven years been increased from 12.8 to 32.5 per cent through improvements in design and by increased compression pressures. Many engines have been operating with different crude oils for periods up to eight months, night and day, without stoppage, attesting to the reliability of these installations. The oil engine has been introduced into pipe line service with satisfactory results. It has not yet been used to any extent in the California oil fields, but with oil from that State its economy, he contended, compares with that of the steam pump.

The main points of Professor Adams's paper were in brief as follows: There are comparatively few Diesel engines in this country at present, the total horsepower being just over 100,000, but the number is increasing rapidly every month. The Diesel engine is being used in sizes up to 1600 hp.-developed in six cylinders, for propelling ships. It

has also been used in submarines and in sailing vessels as auxiliary power. It gives excellent service as a pumping engine and can be used for all kinds of factory service. The engine will burn any fuel which leaves no ash or residue. Western oils are viscous and sluggish, and high in sulphur, water and ash contents, but can be used satisfactorily under proper conditions. Some engines are working on Western oils being sold as boiler fuel oil. Many engines are in operation in Texas, New Mexico and Arizona, using Texas and Mexican oils. The economy of the Diesel engine is the best of all present types. With Eastern refined distillate, 39 deg. B, 19,525 B.t.u. per lb., the fuel consumption is about 0.4 lb. per b.h.p.hr., while with Mexican crude oil, 12 deg. B, 17,360 B.t.u. per lb., it is 0.5 lb. As to cost, in small units the Diesel engine may enter into serious competition with the steam turbine.

A discussion of these papers was entered into by Hans Rudolph Setz, chief engineer of the Fulton Iron Works, St. Louis, and by O. R. Weymouth, chief engineer of Charles C. Moore & Co., San Francisco. Mr. Setz, in reference to the Diesel engine, held that 10 per cent for depreciation is too high. He believed 4 per cent was sufficient and he accordingly would not recommend even 6 per cent. While admitting that the life of the engine has not been long enough to test out all parts, some of them have counterparts in other pieces of machinery, and besides this, one engine in Germany has required merely the renewal of a cylinder liner and a piston after twelve years' operation. He suggested that the society spend part of the funds of the Engineering Foundation for investigating the fuel oils of the country, particularly the asphalt base oils, as experience is showing that neither the specific gravity nor the water content is necessarily an indication of the value of the oil. He considered that European practice has reached the limit in size of engine and a swing in the other direction is desirable.

Mr. Weymouth regarded the conditions in this country as less favorable to the development of the Diesel engine, at least for a good many years, than has been the case in Europe with the high cost of coal, and he considered the economy of the Diesel engine its only advantage. In comparing the Diesel engine with the steam engine, he emphasized the matter of limits of size, mentioning, for example, that the Commonwealth Edison Company of Chicago is now contemplating installing a 50,000-kw. steam turbine, whereas the largest Diesel engine in this country is about 800 kw. capacity. He felt that more reliable information was desirable regarding the costs of Diesel and steam plants.

Mr. Goldingham remarked that the discussion related to the Diesel engine, while his paper covered heavy oil engines as well. The later designs of engines, he added, are arranged to take care of the scale collecting in the water jackets, a condition sometimes mentioned as an objection to this type of engine. It is interesting that Sulzer Brothers of Winterthur, Switzerland, some years ago, declined to build a marine Diesel engine for Mr. Dickie, who said their refusal so to do came after testing some twenty samples of California oil.

STRENGTH OF GEAR TEETH

The paper by Professors Marx and Cutter was a continuation of the paper presented by Professor Marx at the New York meeting of the society in December, 1912. The present paper was discussed by Luther D. Burlingame, industrial superintendent of the Brown & Sharpe Mfg. Company, Providence, R. I., who expressed a desire to have some of the

society's research funds devoted to even further investigating work, and by Miss Kate Gleason, secretary of the Gleason Works, Rochester, N. Y.

Besides opportunities to visit the Exposition on Thursday and Friday afternoons and on Saturday, a number of special excursions had been arranged to works of exceptional engineering interest. At the conclusion of the Thursday morning session, automobiles were provided to take the visitors to the exposition grounds, where luncheon was served in the Old Faithful Inn on the Zone. Then an adjourned meeting of the forenoon took place in the Court of Abundance, and it was at this meeting that President Moore presented the society with a bronze plaque commemorative of the occasion. At this session also Prof. W. F. Durand, Leland Stanford, Jr., University, read an address on the part played by mechanical engineers in the last century.

Our Steel and Machinery Trade with the Philippines

WASHINGTON, D. C., Sept. 28, 1915.—The foreign trade of the Philippine Islands, and especially the importation of iron and steel products, suffered greatly during the fiscal year ended June 30, 1915, as the result of the European war, according to official statistics compiled by the Bureau of Insular Affairs of the War Department. The total imports into the islands during the fiscal year amounted to \$44,479,861, as compared with \$56,011,570 for 1914, a decline of about 20 per cent. The export trade of the islands shows but a small shrinkage, the total in 1915 being \$50,915,061, as compared with \$51,238,048 in 1914. The decrease in the export business would have been much larger but for the phenomenal yield of copra. The high price for sugar, due to the war, also aided in swelling the total value of the islands' exports.

The most notable items of decrease in the importations were in the iron and steel schedule, the receipts under which in 1914 aggregated about \$10,000,000, while in 1915 the total was less than \$4,000,000. The imports, however, were more exclusively American than ever before, the share of the United States amounting to 78 per cent. Importations of automobiles, which are not included in the iron and steel schedules in the customs returns, were valued at but \$475,496 in 1915, as compared with \$1,013,892 in 1914. The imports of machinery in 1915 totaled \$1,340,084, or hardly one-third the receipts of 1914, which aggregated \$3,665,352. Imports of corrugated roofing declined proportionately, the total in 1915 being \$329,065, as compared with \$1,090,867 in 1914. Miscellaneous importations of iron and steel products aggregated \$2,324,835 in 1915, as against \$5,348,769 in 1914.

The following table shows the share of the United States and the principal competing countries in the imports of automobiles and iron and steel products for the fiscal year 1915, as compared with 1914:

Imports	1914	1915
Automobiles	\$1,013,892	\$475,496
United States	798,902	434,262
Other countries	214,990	41,234
Iron and Steel:		
Machinery	3,665,352	1,340,084
United States	2,169,562	947,364
United Kingdom	585,600	226,169
Other countries	910,190	166,551
Corrugated roofing	1,090,867	329,065
United States	943,486	287,065
Other countries	147,381	42,000
All other	5,348,769	2,324,835
United States	4,102,457	1,897,791
United Kingdom	444,070	171,025
Other countries	802,242	256,019

Recent advices from the islands indicate a slow recovery in the volume of imports since the beginning of the new fiscal year, a marked feature of which is the proportionate increase therein of the share of the United States, which in 1915 amounted to 50 per cent.

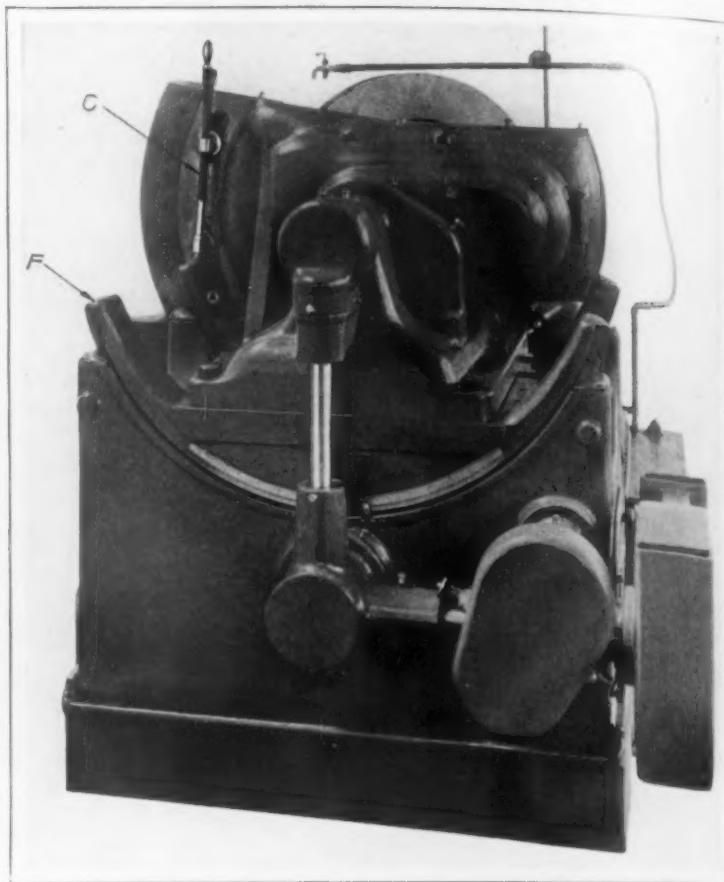
W. L. C.

AUTOMATIC BEVEL GEAR GENERATOR

Planer Type Machine with a New Generating Motion

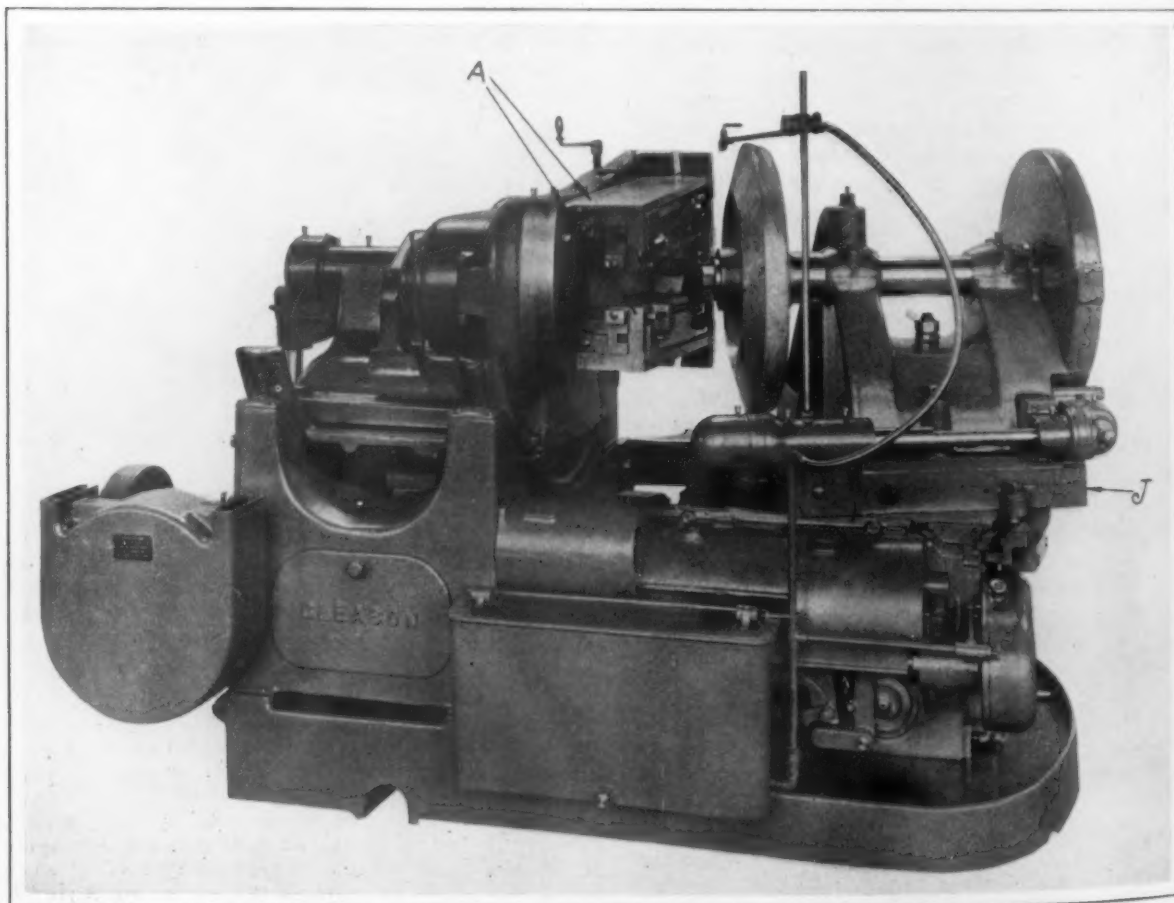
A new size of gear generating machine, with a new type of generating motion, has been placed on the market by the Gleason Works, Rochester, N. Y. The machine is designated by the builder as its 25-in. two-tool bevel gear planing generator and is fully automatic in operation. It is possible to plane gears having a long hub on the back, provision being made for setting the end of the spindle 20 in. from the tools, while pinions which are solid on a stem can be planed as the spindle is made hollow for this purpose. Small floor area, comparatively, for the output is emphasized, as is also the locating of the oil pumps used for forced lubrication within the cradle base.

The tools are mounted in clapper blocks carried on long slides which operate in arms A, the slides being protected against chips and dirt. The graduated crank plate B enables the length of stroke to be varied up to a maximum of 6 in., and the arms are adjusted to any of the customary tooth angles by a turnbuckle, C, and the graduations D. After the proper angle is secured the arms are securely fastened to the carriage E. The tools are of the

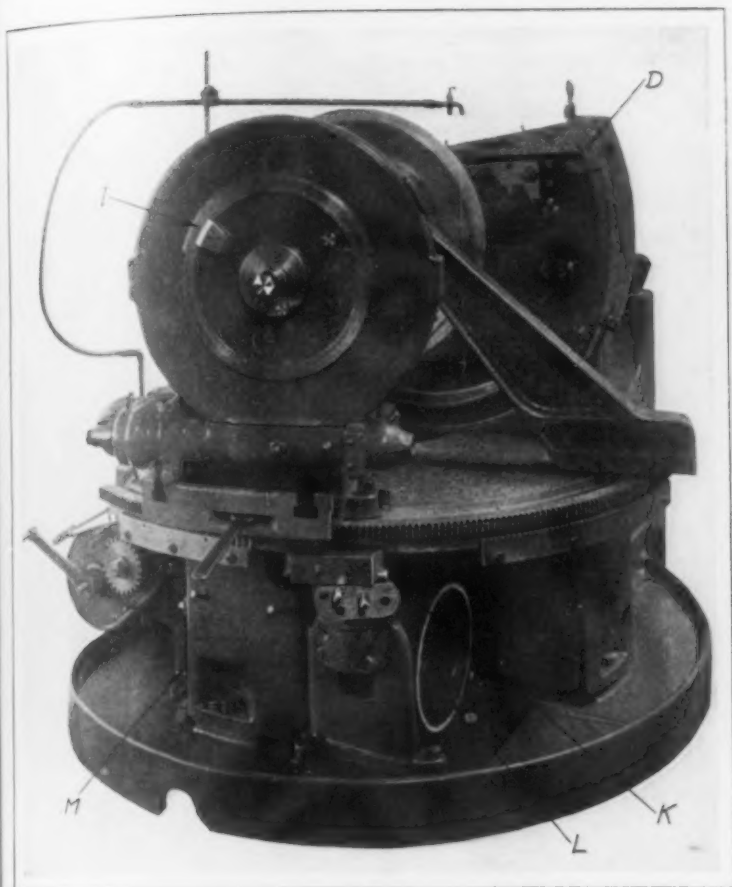


The Turnbuckle C Adjusts the Arms for Any Desired Tooth Angle and F is the Cradle Supporting the Tool Carriage

rack tooth type and can be made for $14\frac{1}{2}$ and 20 deg. or any other desired pressure angle. The cutting part is made of high-speed steel and is



Front View of the Gleason Automatic Machine for Generating Bevel and Flat Gears Having Maximum Diameters of 25 and 32 In. Respectively



The Graduated Lever K Controls the Depth of the Cut and the Swinging Base is Driven by the Cam L Which Derives Its Motion from a Worm

mounted on a carbon steel holder. This arrangement, it is emphasized, is advantageous on account

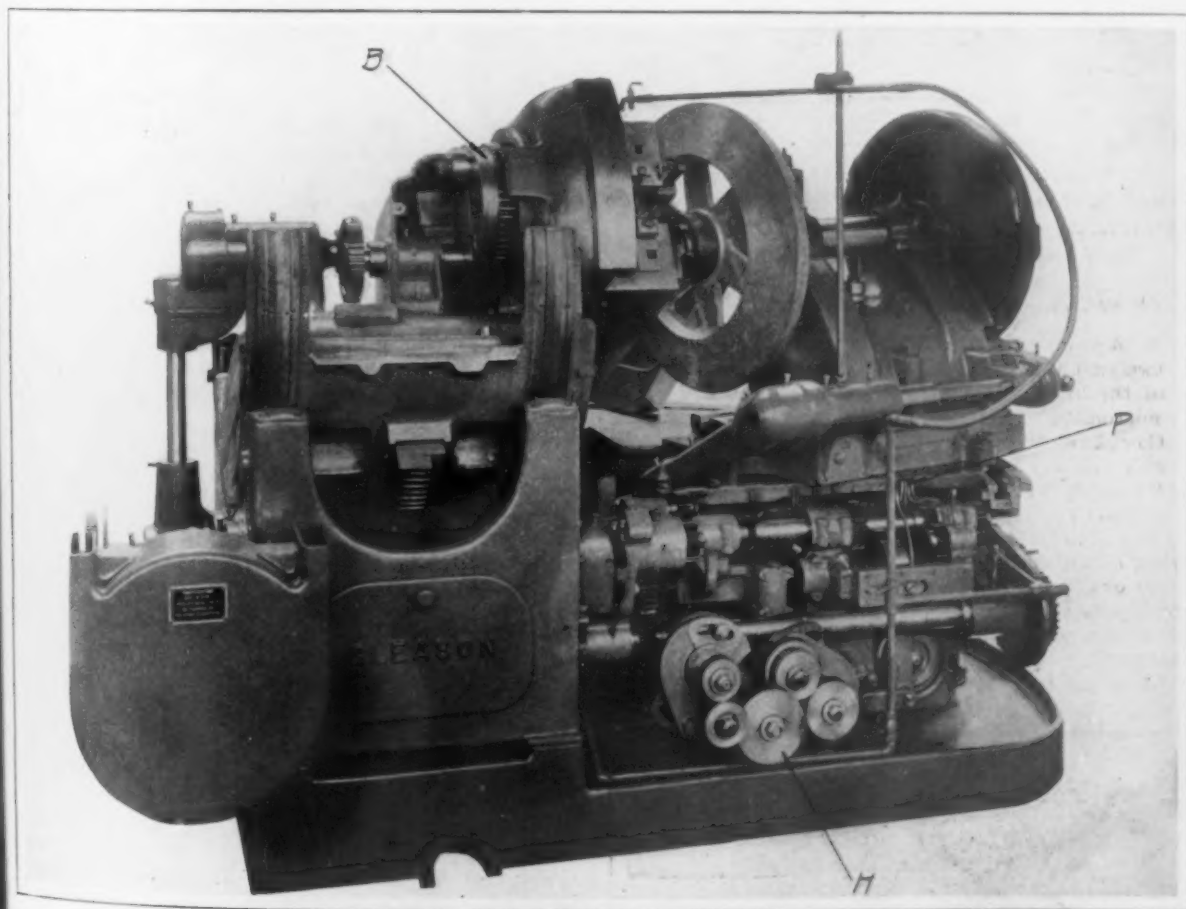
the swinging index bracket used on earlier machines thus effecting a saving of floor space.

of the recently increased cost of high-speed steel as well as possessing the feature of being readily changed to suit other pitches by regrinding. The change gears G vary the speed of the tool slide.

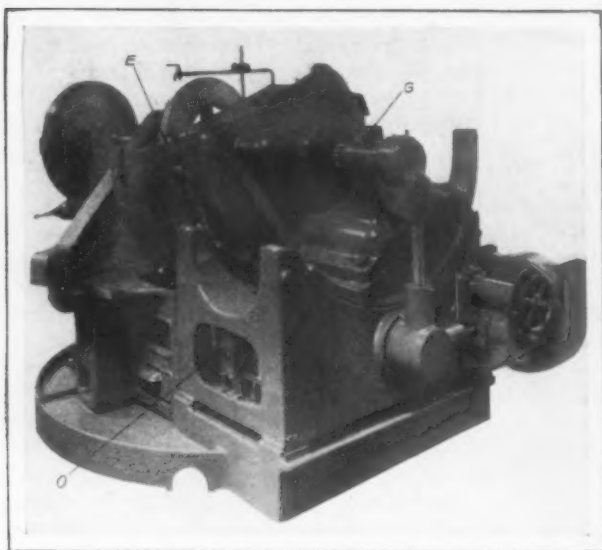
The carriage holds the mechanism for driving the tool slides and is bolted solidly to a cradle, F. This member has circular V-ways with large bearing surfaces and forced lubrication, both of which are relied upon to maintain the proper alignment.

A new type of generating motion is employed in this machine in which the cradle carrying the tools and the spindle carrying the work are rolled by a reversing mechanism, the drive being transmitted to each member. The final pair in each train is a worm and worm wheel, and the correct relative roll is secured by compound change gears H, while graduations I enable the operator to check up the accuracy of the roll whenever this is desired.

The indexing mechanism is positively driven and operates by one turn of a stop plate. This motion is joined by a differential mechanism with the drive for the generating roll of the work and a single train of driving parts carries the combined motions to a worm wheel on the spindle. This construction, it is emphasized, is of a very compact design and eliminates



B Regulates the Length of the Tool Stroke, H Controls the Relative Roll of the Tools and the Work, and Some of the Oil Tubes Are Shown Grouped at P



Three-Quarter View Showing the Carriage E, the Gears G Which Vary the Speed of the Tool Slides and the Oil Pump O

The head is mounted on a swinging base, J, which carries the work to the tools, a graduated lever, K, providing the necessary adjustment for the proper depth of the cut. A cam, L, which is driven by a worm and worm wheel running in an oil bath, M, drives the base.

All of the worm wheels, cradle ways, heavy-duty gears and cutting tools have forced lubrication from two pumps located inside the cradle base at O. This location is accessible at all times and saves room as well as guarding the gears and chains driving the pumps. All the other oil tubes are in groups at convenient places, such as is shown at P, so that the operator is not likely to overlook any.

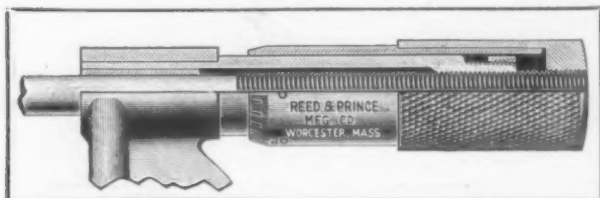
The tools are set by gages which can be tested at any time by proof plug, and the blank can be set to position by a cone distance gage.

The machine can cut flat gears of 8 to 1 ratio and up to 32 in. in diameter, while the largest diameter of miter gear that can be handled is 25 in. The greatest face width is 5 in. The floor space required is 76 in. wide and 98 in. long, and the net weight of the machine is 11,000 lb. The time of finishing one tooth ranges from 30 to 170 sec., depending on the material and the size of the blanks to be cut.

New Model of Reed & Prince Micrometers

A simple adjustment for wear by the use of a two-part thimble in place of an adjustable anvil is one of the interesting features of the new standard model micrometer manufactured by the Reed & Prince Mfg. Company, Worcester, Mass. Eliminating the adjustable anvil makes it possible to lessen the depth of frame at the anvil so that the new model can be used in narrower places.

The knurled portion of the two-part thimble, illustrated herewith in section, is fixed to the spindle. The sleeve or plain part of the thimble can be rotated to compensate for wear so that the zero marks on sleeve and barrel can be made to coincide when the spindle and anvil surfaces are in contact. The permanency of the adjustment is assured by making the two parts



Reed & Prince Micrometer with Two-Part Thimble

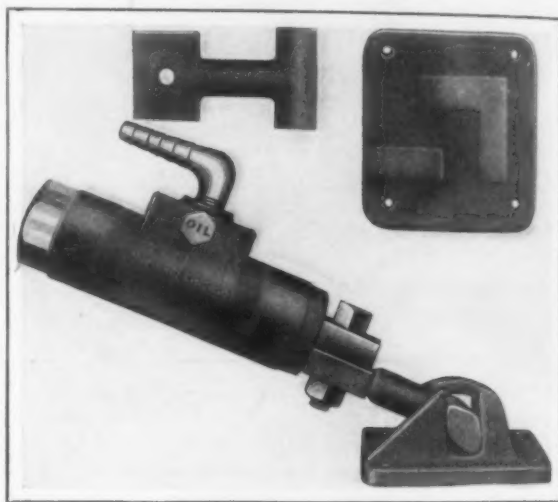
of the thimble a friction fit. When assembled they are locked together and a spanner wrench must be employed to make the adjustment. This adjustment is accurately accomplished by using the same spanner as used for adjusting the tension nut. It is emphasized that there is no danger of the setting being changed until so desired.

A hardened bushing, ground and lapped to size, is pressed into the frame to guide the spindle. The spindle is threaded and locked into the thimble, making a rigid joint.

Pneumatic Vibrator for Molding Machines

A new form of vibrator for use in rapping patterns has been brought out by the Vulcan Engineering Sales Company, 2059 Elston Avenue, Chicago, Ill. This is intended for use in connection with an extension and a match board attachment. The vibrator is designed to free the match board and the pattern of the sand of the mold after the flask is rolled over.

In use the attachment is bolted to the match board and the extension is permanently connected to the vibrator. With this arrangement it is only necessary to drop the tongue of the extension into the sockets of the attachment, as is shown in the accompanying illustration. The weight of the vibrator is relied on to keep the connection of the extension to the attachment



A Modified Form of Pneumatic Vibrator for Molding Machines Intended for Use with an Extension and Match Board Attachment

rigid and to give vibration at the proper angle with the face of the mold.

The vibrator can be supplied in several sizes for use with air hose ranging from 1/2 to 2 in. in diameter. The body of the vibrator is of drop forged steel and the piston is finished by grinding and lapping.

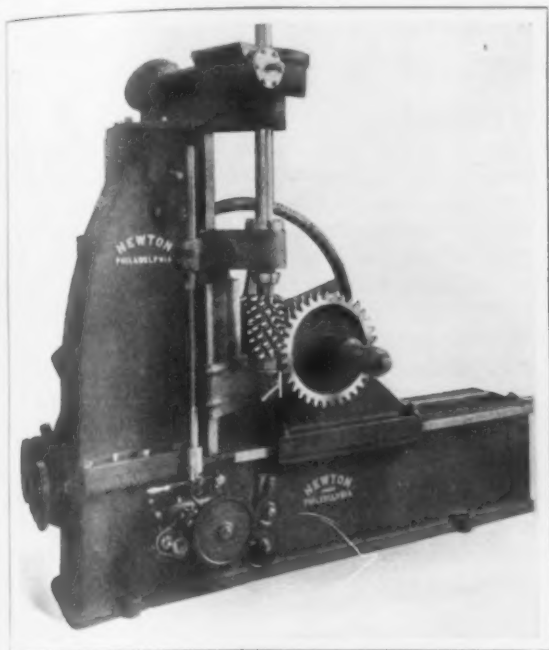
German Cast-Iron Shells

Cast-iron shells, made by the Germans, have recently been found within the British lines. A contributor to the Sheffield (England) *Daily Telegraph* states that he has examined pieces of these shells microscopically and has found that the suggestion that the cast iron thus employed must be of a superior kind is unfounded. The material consists of a mass of pearlite in which plates of graphite are embedded in the usual way, together with considerable quantities of free phosphide. It was evidently a strong iron of fairly low silicon made from ordinary foundry grades.

A discovery of molybdenite is reported at the head of Lost Creek, near Salmo, in the Nelson mining division of British Columbia. The deposit appears to be of considerable size and two carloads have already been mined. Concentration will be necessary to bring it up to 85 per cent molybdenite.

Machine for Generating Worm Wheels

The Newton Machine Tool Works, Inc., Philadelphia, Pa. has recently built a worm wheel cutting machine for use in its own plant. It employs



Worm Wheel Cutting or Generating Machine Using Either Fly Cutters or a Taper Hob

either fly cutters or a taper hob, and the cutter is fed at a tangent to the circumference of the wheel. The cutter or hob employed is in the form of a tap. It is located so that the distance between the centers of the work and the cutter is the same as that between the worm axis and wheel center in actual operation and the angle between the cutter and the plane of the wheel is the same as that on which the worm actually runs. During the entire process of cutting these measurements remain unchanged.

In producing worm wheels with this machine, a departure is made from the general practice of feeding the cutter in a radial direction to the wheel center and thus cutting the teeth of the wheel gradually deeper. With this machine the cutter is fed at a tangent to the circumference of the wheel thus cutting first with the tapered end into the solid metal, the depth of the teeth gradually growing as the diameter of the cutter increases while being fed across the surface, the full end furnishing the teeth.



A Sample of Large Work That Can Be Done by the Machine. This worm wheel has an external diameter of 47½ in. and its 92 teeth were cut in 10 hr.

Some idea of the variety of work that can be turned out by these machines is presented in the accompanying illustrations. The larger of the two wheels has an outside diameter of 47½ in. and the face width is 5½ in. This wheel is of the triple lead type and its 92 teeth were cut in 10 hr.

Pneumatic Rock-Over Molding Machine

Henry E. Pridmore, Inc., Chicago, Ill., has equipped its 24 x 29-in. rock-over drop molding machine with an air cylinder. This addition, it is emphasized, has increased the rock-over capacity of this style of machine which is built with drops of 8 and 12 in. With this machine the roll over, draw and return are controlled by a single lever.

In operation when the bottom board has been clamped on the flask, the controlling lever is pushed to the left and the rolling over of the mold started. By moving the lever in the opposite direction the flask rests are raised to receive the flask. These rests adjust themselves automatically to crooked or uneven bottom boards and can be spread to accommodate longer flasks, as holes in the cross beam are provided for this purpose. The clamps are next removed and the controlling lever moved slightly toward the neutral position to exhaust the air from the cylinder and draw the mold away from the pattern. Another movement of the lever to the left rolls the pattern back ready for the next flask.

In the construction of this machine reliance is not placed on the piston to maintain the alignment.



A Rock-Over Drop Molding Machine Equipped with an Air Cylinder

The flask rests are fastened to a cross beam supporting the draw arms that travel vertically on two steel uprights set in the main frame of the machine, which are relied upon to maintain the proper alignment.

The Endicott Forging & Mfg. Company, manufacturer of drop forgings, Endicott, N. Y., which bought the plant of the L. S. White Forging Company in July, is running a day and night shift. It has recently purchased the following additional equipment: One Williams & White 5 x 5-in. billet shear, 34-in. King boring mill, No. 6 Jackson die-sinking machine, 30 x 30-in. x 10-ft. Ohio planer, 800-lb. Bliss friction board hammer, 2000-lb. Bliss friction board hammer, No. 75½ Bliss press, and a 2000-lb. Chambersburg friction board hammer.

The Crucible Steel Company of America will shortly place in operation its Norwalk, Ohio, plant, which has been closed down for about two years. The finishing department will not be operated as the billets produced will be shipped to the company's plant at Midland, Pa.

Properties and Uses of Military Explosives

Nitro-glycerine and Nitro-cellulose as Fundamental Forms—the Pro- pellant and the Disruptive Classes

— BY LIEUT. LOGAN CRESAP, U. S. N —

Reference to the various kinds of military explosives, in the press and in conversation, is quite frequent at the present time. As many of the terms by which they are designated are trade or professional, or even purely arbitrary, in no way indicating the composition or general nature of the explosives, much confusion exists in laymen's minds; and it may be interesting to have this confusion removed by a general and brief discussion of the subject in non-technical language.

SLOW AND FAST EXPLOSIVES

From a military point of view there are two distinct classes of explosives—slow and fast. The slow explosives are those in which the rate of burning or decomposition is comparatively slow or can be controlled or regulated. Their explosion is called a slow or low order explosion. Such explosives are used as propellants, or as motive power for projectiles, in guns. Generally speaking, therefore, the slow explosives are called propellant explosives. The fast explosives are those in which the rate of burning is not controlled; in fact, the desideratum is to obtain, within certain limits, as rapid a decomposition or explosion as possible. Such explosions are generally called detonations, or high order explosions, and are of course more destructive or violent than slow explosions. Explosives of this kind, that is fast or disruptive explosives, are used in shells, mines, torpedoes, etc., to produce destructive results. They are also referred to as "high explosives." The decomposition or explosion of slow explosives is generally started by the application of heat; that is, they are "ignited." The decomposition or detonation of high explosives is generally started by the application of a violent shock, and they are said to be "detonated." To further distinguish between these phenomena, it may be stated that the explosion of slow explosives in a gun occupies an appreciable interval of time, longer than a fiftieth of a second, while the detonation of a high explosive is practically instantaneous, measurements having shown that some detonations spread at a rate of about 10,000 ft. per second.

There are many other requirements, in addition to conformity with the above classification, with which military explosives must comply. They must all have a reasonable life or stability, must be safe so far as ordinary handling is concerned, must be uniform in their action, must not require other than reasonable precautions to insure their quality, and should not have their explosive qualities affected at ordinary temperatures.

FUNDAMENTAL FORMS

Both propellant and disruptive explosives may contain the same basic explosive, in mechanical mixture, in different forms or proportions, and it is best, therefore, to consider these explosives in their fundamental forms before going into their particular uses.

Nitro-glycerine, one of the most common explosives, is made by treating glycerine with a mixture of nitric and sulphuric acid. It is a colorless,

odorless, oily liquid. The glycerine itself is generally obtained as a by-product in the soap and stearine candle industry.

Nitro-cellulose, another of the most common explosives, is made by treating substances containing cellulose, such as cotton, flax, wood fiber, jute, etc., with a mixture of nitric and sulphuric acids. The substance most generally used to-day is cotton, and many forms of cotton can be used, such as baled cotton, linters, cotton waste, yarn, and even, if necessary, rags and cloth. One pound of cotton will make about one and a half pounds of nitro-cellulose. Wood fiber in the form of pulp, such as is used in paper manufacture, by careful handling and by special processes can be made to give a material suitable for the manufacture of nitro-cellulose; but with an available supply of cotton it is not generally used, though it has been used for certain sporting powders. By varying the strength of the nitric acid in the bath and the temperature at which action takes place, the resulting nitro-cellulose can be made to contain varying amounts of nitrogen, and the amount of nitrogen in nitro-cellulose bears a most important relation to its subsequent use. The amount of nitrogen is generally expressed by the relative terms, "high nitration," "medium nitration," "low nitration," etc. It may be interesting to note, in passing, that low nitration nitro-cellulose is not used for explosives, but is present in collodion, celluloid, artificial leather, etc., and to a limited degree in artificial silks and mercerized cottons. Nitro-cellulose resembles cotton in appearance and color.

PROPELLANT EXPLOSIVES

Black powder in various forms was the sole propellant for many years and was only superseded by the so-called smokeless powders within comparatively recent times, the first successful smokeless powder having been brought out in the latter half of the last century. Black powder is still used as a propellant in sporting guns. Black powder for military purposes is a mechanical mixture of about 75 per cent saltpetre, 10 per cent sulphur, and 15 per cent charcoal, and is at present used as a bursting charge for shrapnel and some shell. Here it is really a propellant, as it only breaks the shell into comparatively large pieces and propels the fragments and contents over large areas. No satisfactory substitute for black powder, for use in time trains, time fuses, etc., can be found, and here it is supreme.

Nitro-cellulose gunpowder is a smokeless powder and can be used in different shapes in all sized guns. Various methods of manufacture are used in different localities, and additions of small quantities of other substances are made by different manufacturers. Such variations result in slightly different products, so that no specific composition can be stated. The general characteristic of nitro-cellulose gunpowder, however, is a great preponderance of nitro-cellulose, the content being about 95 per cent. In America, nitro-cellulose of comparatively high nitration is mixed with ether and alcohol.

This mass, which is like a stiff jelly or dough, is pressed into the grain shape desired, and the ether-alcohol is later almost completely evaporated out, leaving the nitro-cellulose in a hard translucent condition. The speed of explosion is decreased by this gelatinizing process and is further regulated by the shape and size of the grains. In France different methods are used, nitro-cellulose of different nitration and other solvents being used.

Nitro-glycerine gunpowder is a smokeless powder and can also be used in all sized guns. It varies somewhat in different countries, in different methods of manufacture, in different proportions of contents and goes by different names such as ballistite, filite, solenite, cordite, etc. The British m. d. cordite, the best-known example of this class of gunpowder, contains about 65 per cent nitro-cellulose, 30 per cent nitro-glycerine, and 5 per cent vaseline. Other kinds of nitro-glycerine gunpowder contain as high as 58 per cent of nitro-glycerine. These ingredients are mixed with acetone to form a dough-like substance which is pressed into the shape desired and the acetone is afterward almost completely evaporated out leaving the powder comparatively hard. The speed of explosion is decreased by this gelatinizing process and is further regulated by varying the shape of the cords, strips or grains into which it is formed.

The United States, France, Russia and Spain use nitro-cellulose powders in practically all guns. Great Britain and Italy use nitro-glycerine powders in practically all guns. The other powers use nitro-cellulose powders for small arms and nitro-glycerine powders for larger guns. This use of powders was in force about a year or so ago. Since then modifications to some extent have probably taken place, the proportion of nitro-cellulose powders probably increasing, due to the consumption of American powders which are practically all nitro-cellulose.

DISRUPTIVE EXPLOSIVES

Dynamite, probably the most widely known disruptive explosive, is simply nitro-glycerine absorbed in some carrying medium. Nitro-glycerine is itself a disruptive explosive, but it is exceedingly dangerous to handle. As soon as means of converting it into a solid were found it became extensively used. Wood pulp, infusorial earth, sodium nitrate, ammonium nitrate and other materials are used as an absorbent in different localities, the products all being classed as dynamites. Medium nitrated nitro-cellulose is also used to absorb the nitro-glycerine, about 7 per cent or 8 per cent nitro-cellulose being present in the product, and this material is called explosive gelatine. Dynamite is used for mining and demolition purposes by armies, because of its extensive commercial use, but has no naval uses. The great defect of dynamite is its liability to freezing in cold weather and the danger in thawing.

Gun-cotton, a very high nitration nitro-cellulose, is very powerful and has had quite a large use for demolition purposes and in marine mines, torpedoes, etc. It is still quite extensively used, but is becoming superseded for various reasons by other explosives.

Picric acid, an exceedingly powerful explosive, is made by treating phenol or carboic acid, a coal tar by-product, with sulphuric and nitric acids. The resulting compound is a solid of light yellow color. Its almost universal military use resulted when its ability to withstand mechanical shock was discovered. It is subject to certain disadvantages, however, and its salt, ammonium picrate, sometimes replaces it. Picric acid, or some modification thereof, is one of the principal military high explosives and

is used in mining operations or as a bursting charge for bombs and high explosive shells. It is the principal constituent of the American dunnite, the English lyddite, the Japanese shimose, the French mélinite, the German granatfullung 88, the Italian pertite, the Austrian ecrasite, the Spanish picrinite, and the Swedish coronite.

Trinitrotoluene, commonly called t.n.t., is steadily gaining in use, and is replacing under certain conditions and for certain uses, both gun cotton and picric acid. This material is made by treating toluene, a coal tar by-product, with nitric and sulphuric acids. It is a dark yellow or brown crystalline compound, can be easily melted and can be poured while molten into its container. It is used in bombs, some high explosive shells, marine mines and torpedoes, and is sometimes incorporated in dynamite, whose freezing point it tends to lower. Lead nitrate is sometimes added to t.n.t. for certain purposes and this mixture is called macarite.

Ammonal, a mixture of approximately 85 per cent ammonium nitrate, 10 per cent aluminum and 5 per cent carbon, has been used to a limited degree in Austria as a shell burster, but its use has not spread. About 15 per cent t.n.t. is sometimes incorporated in the mixture.

Tetranitromethyl-aniline, called tetryl, is made by treating methyl-aniline, a coal tar by-product, with a mixture of nitric and sulphuric acids. It is a pale yellow crystalline material and is a comparatively recent development in military explosives. Its use is probably very limited.

Tetranitraniline is made by nitrating aniline, a coal tar by-product. It is a yellow crystalline material, and about the latest development in military explosives. As yet it is not used, but as it is one of the most powerful solid explosives known, if not the most powerful, it will in time probably find extensive military use.

Fulminate of mercury, a heavy, light gray solid compound, is made by treating mercury with nitric acid and alcohol. It is very sensitive and exceedingly rapid and violent. It has no use by itself, as the effects of its explosion are comparatively local, but it has the very interesting quality that it can be detonated by either percussion or heat. It is the only practical high explosive which has this quality, all other military disruptive explosives needing some great shock to start their detonation. Because of this quality fulminate of mercury is used to start the detonation of other high explosives, and is, therefore, present in all blasting caps, fuses, fuse caps, detonators, etc., which devices are the starting points of all intentional high order explosions.

MISCELLANEOUS EXPLOSIVES

There are a few other materials which have an important though limited use for military purposes. Potassium chlorate and sulphide of antimony are used in cap manufacture. Saltpetre, charcoal, sulphur, potassium chlorate, magnesium, potassium perchlorate, barium compounds, sodium compounds, copper compounds and strontium compounds all have some use in rockets, tracers, incendiary bombs and colored lights for illuminating or signaling purposes.

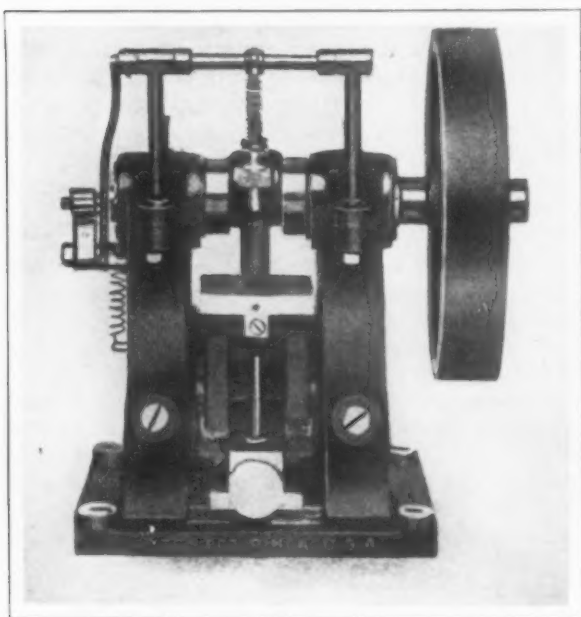
The Dominion Steel Foundry Company, Ltd., Hamilton, Canada, is completing an addition to its main foundry building, 100 x 160 ft., equipped with one 25-ton acid open-hearth furnace and one 30-ton Shaw electric 4-motor crane. Some time ago the company installed a complete outfit for machining 3-in. shrapnel, and it has recently put in a set of machinery for finishing 4.5-in. howitzer shells.

Dynamic Properties of Steel Castings*

Vibratory Results on Carbon, Vanadium and Nickel-Chrome Steels Compared— The Historical Steps in Fatigue Testing

BY J. LLOYD UHLER

The recognized importance of knowing something more than the static properties of steel employed in the manufacture of castings for various uses led some of the steel foundrymen to make a thorough study of their product in recent years. It is just as essential to know the probable behavior of steel in service, which is subjected to shock or



The Turner-Landgraf Vibratory Testing Machine

alternating stresses, as it is to know the static properties of the steel used. Too much reliance generally is placed upon the limited information furnished by the static tension test, with the result that numerous failures in practice are often inexplicable. For that reason experiments were begun to look for some other device which, in a commercial manner, would divulge something concerning the other properties of the castings.

It has been long understood that materials are liable to degenerate in quality at a rate depending upon the service which they undergo. The fact is being recognized that resistance to fatigue is not entirely a function of static strength.

THE ORIGINAL VIBRATING MACHINE

In 1907 the manufacture of vanadium steel castings was started on a small scale and one of the claims for this steel was resistance to fatigue. This was investigated to determine whether it could be substantiated, and in July, 1907, test bars of carbon and vanadium steels were prepared, which were tested, by courtesy of the Pennsylvania Railroad Company, at Altoona, Pa., on an improvised vibratory machine which was used for making tests of staybolt iron. This machine was an old slotter that had been equipped for making vibratory tests and

was provided with a registering device which gave a complete record of the number of alternating stresses. The bar was fastened rigidly in a vise and extended out to the slotter arm, 8 in. distant. It had a plate fastened to the arm with a hole through it so that the free end of the test bar, which was supplied with a round nut, could be placed in it with an allowance of $\frac{1}{4}$ -in. play, thereby allowing the test bar to be deflected $\frac{1}{8}$ in. each side of the neutral position. This machine gave only 30 vibrations per minute. The size of the bar was $\frac{5}{8}$ in. round and 15 in. long.

The Turner and Landgraft testing machine was next employed by investigators. This is the new modification of Wohler's method of dynamic testing, which was introduced in 1905 by Professor Arnold of Sheffield, England. In making this test the piece is held securely in a vise at one end and is moved backwards and forwards by a slotted arm which communicates to the piece successive permanent distortions in each direction, produced by impact and followed immediately by a pushing motion. As a result, the test piece is fractured finally on the line of the vise at which point the most severe stresses are created. The slotted arm moves on a crank, so that the pushing motion is performed without the interfering factor of *rub* as the slotted arm describes the same arc as the distorted test piece. The design of the machine is shown by an illustration.

WOHLER ENDURANCE TESTING MACHINE

The next series of tests was made on the Wohler dynamic or endurance testing machine. It subjects a specimen to a reversal of bending stresses on a rapidly rotating bar, but this form of testing often gives widely varying results, even from the

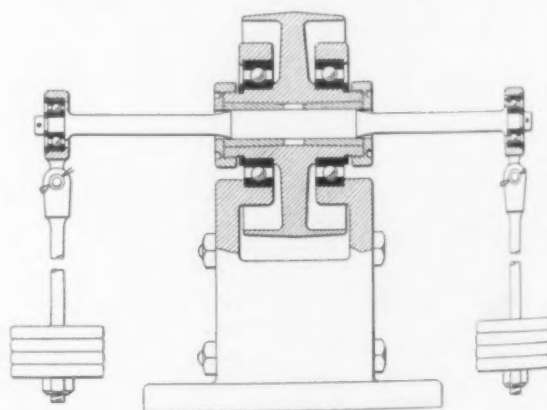


Diagram of the Wohler Dynamic Testing Machine

same bar and does not necessarily detect dynamically weak steel. It is known in this country as the Souther test. Professor Arnold's original idea in devising this test was to introduce the Wohler method to practical use by reducing the time needed to make this test, namely from days and hours, to minutes. His argument was, that instead of making the test within the elastic limit, but which always was made just beyond it, the result would

*From a paper presented at the convention of the American Foundrymen's Association at Atlantic City, N. J., Sept. 27 to 30, 1915. The author is chief chemist and metallurgist of the Union Steel Castings Company, Pittsburgh, Pa.

quickly reflect the liability to fracture within the elastic limit, under stresses applied for a long period. But it was found that the test predicted liability to fracture from causes altogether aside from the Wohler fatigue phenomenon and registered potential brittleness, which the Wohler test not only failed to detect, but pronounced absent. This series of tests was made on the machine shown in another illustration.

The investigators then made a series of tests employing the vibratory machine designed by the American Locomotive Company. It is built especially strong and the bed, or frame, is so heavy that a specimen of steel 1 1/4 in. in diameter and having

an elastic limit of 125,000 lb. per square inch can be tested without causing the frame of the machine to vibrate. This machine was described and illustrated in THE IRON AGE of July 9, 1914.

The experiments especially referred to in this paper were made on a Turner and Landgraff machine and the results are given in the table. The test pieces were 8 in. long, and by reversal, two tests could be obtained from one sample, thereby securing an indication of the uniformity of the metal represented by the test piece. Also the thoroughness of the annealing was thus ascertained, as steel, according to its composition, or rather according to the manner in which the component elements are

Table of Static and Dynamic Results Obtained on Various Grades of Steel Castings

Castings made from steel containing 0.20 to 0.25, 0.25 to 0.30, 0.33 to 0.40 and 0.40 to 0.50 per cent carbon
Castings made from vanadium steel containing 0.23 to 0.28, 0.38, 0.47 and 0.49 per cent carbon
Castings made from chrome-nickel steel containing 0.31 to 0.38 per cent carbon

Heat No.	Elastic limit, lbs. per sq. in.	Ultimate strength, lb. per sq. in.	Elongation in 2 inches, per cent	Reduction of area, per cent	Vibrations	Average vibrations	Carbon, per cent	Phosphorus, per cent	Manganese, per cent	Sulphur, per cent	Silicon, per cent	Vanadium, per cent	Nickel, per cent	Chromium, per cent
730	34,900	67,400	27.5	42.46	2,354		0.205	0.043	0.700	0.032	0.270			
704	34,880	63,400	39.0	55.02	2,453		0.205	0.043	0.700	0.032	0.270			
					2,248	2,437								
					2,693									
333D	32,040	70,400	28.5	43.8	3,520		0.240	0.045	0.570	0.038	0.249			
333D	32,200	69,900	31.0	51.0	2,280	3,102	0.240	0.045	0.570	0.038	0.249			
333D	31,130	70,040	30.0	47.9	3,510		0.240	0.045	0.570	0.038	0.249			
875	37,160	71,700	33.0	48.2	2,010	1,918	0.250	0.036	0.600	0.024	0.230			
875	36,710	70,180	31.5	52.8	1,826		0.250	0.036	0.600	0.024	0.230			
29D	37,240	69,460	29.5	49.6	3,128	3,449	0.250	0.032	0.610	0.028	0.259			
29D	39,600	69,680	29.5	50.1	3,770		0.250	0.032	0.610	0.028	0.259			
27D	36,950	71,650	29.0	45.2	3,972	3,228	0.270	0.031	0.580	0.028	0.277			
27D	36,740	71,460	29.0	46.8	2,483		0.270	0.031	0.580	0.028	0.277			
470C	38,510	76,700	29.0	44.1	3,512		0.270	0.047	0.630	0.027	0.280			
470C	38,050	76,100	29.0	46.9	2,940	3,104	0.270	0.047	0.630	0.027	0.280			
470C	37,240	76,500	28.5	47.4	2,860		0.270	0.047	0.630	0.027	0.280			
473C	38,560	79,660	25.0	45.5	3,255		0.280	0.044	0.630	0.026	0.329			
473C	38,050	80,680	24.0	42.5	3,522	3,522	0.280	0.044	0.630	0.026	0.329			
473C	38,210	78,960	27.5	45.2	3,378		0.280	0.044	0.630	0.026	0.329			
424C	34,750	73,400	25.0	41.3	3,803	3,867	0.330	0.034	0.610	0.030	0.290			
424C	35,800	78,380	22.0	44.3	3,930		0.330	0.034	0.610	0.030	0.290			
61C	44,790	91,100	21.0	27.5	3,029		0.370	0.043	0.700	0.025	0.305			
61C	45,480	91,970	21.5	36.5	3,066	3,258	0.370	0.043	0.700	0.025	0.305			
61C	43,930	89,870	22.0	39.4	3,679		0.370	0.043	0.700	0.025	0.305			
81C	43,280	88,580	24.5	37.7	3,009		0.375	0.044	0.740	0.029	0.291			
81C					2,945	3,115	0.375	0.044	0.740	0.029	0.291			
81C					3,393		0.375	0.044	0.740	0.029	0.291			
47D	40,600	84,720	25.0	40.1	2,958	3,154	0.386	0.046	0.680	0.035	0.300			
47D	40,100	82,710	23.0	33.8	3,350		0.386	0.046	0.680	0.035	0.300			
9034	57,460	96,740	19.0	30.7	1,999	1,999	0.400	0.049	0.730	0.029	0.310			
9034	60,100	97,340	17.5	23.0			0.400	0.049	0.730	0.039	0.310			
9215	45,690	76,620	27.5	51.1			0.235	0.047	0.575	0.030	0.250	0.145		
9215	42,590	78,200	31.0	51.8		3,265	0.235	0.047	0.575	0.030	0.250	0.145		
464C	48,550	82,620	26.0	47.7	2,978		0.235	0.028	0.590	0.025	0.280	0.180		
464C	48,530	79,900	25.5	49.8	2,722	3,057	0.235	0.028	0.590	0.025	0.280	0.180		
464C	46,740	73,900	29.5	52.2	3,471		0.235	0.028	0.590	0.025	0.280	0.180		
479C	47,330	75,000	29.5	53.8	3,360									
479C	46,440	72,120	29.5	52.8	3,054	3,273	0.245	0.038	0.610	0.029	0.310	0.190		
479C	47,420	79,460	25.5	49.1	3,406		0.245	0.038	0.610	0.029	0.310	0.190		
77E	48,400	77,500	27.5	45.6	3,096	2,952	0.250	0.042	0.572	0.023	0.250	0.194		
77E	49,380	80,120	27.5	48.0	3,434		0.250	0.042	0.572	0.023	0.250	0.194		
306D	47,500	75,040	27.5	50.0	4,218		0.250	0.038	0.550	0.030	0.254	0.200		
306D	46,810	74,980	29.0	53.2	4,102	4,074	0.250	0.038	0.550	0.030	0.254	0.200		
306D					3,902		0.250	0.038	0.550	0.030	0.254	0.200		
433E	47,750	82,870	23.5	44.2	4,510		0.255	0.041	0.580	0.035	0.268	0.178		
433E	48,010	80,860	23.5	44.2	4,356	4,192	0.255	0.041	0.580	0.035	0.268	0.178		
433E	48,310	83,540	22.0	42.9	3,710		0.255	0.041	0.580	0.035	0.268	0.178		
372D	47,500	80,000	24.0	39.0	2,966	2,966	0.260	0.035	0.510	0.028	0.260	0.203		
67E	49,060	82,080	26.0	44.5	3,190		0.260	0.039	0.624	0.025	0.291	0.205		
67E	47,420	78,480	28.0	48.0	3,480	3,335	0.260	0.039	0.624	0.025	0.290	0.205		
74E	48,720	79,320	26.0	47.7	3,476		0.260	0.043	0.576	0.022	0.260	0.190		
74E	49,380	80,640	25.0	50.1		3,476	0.260	0.043	0.576	0.022	0.260	0.190		
35E	41,760	79,640	28.0	44.2	4,320		0.265	0.034	0.638	0.023	0.270	0.203		
35E	41,190	82,380	26.0	43.6	3,610	3,965	0.265	0.034	0.638	0.023	0.270	0.203		
220D	48,120	86,220	23.5	40.1	3,834		0.280	0.026	0.660	0.028	0.306	0.165		
220D	48,620	88,720	21.0	38.6	3,728	3,781	0.280	0.026	0.660	0.028	0.306	0.165		
437E	64,180	111,670	15.0	28.6	2,776		0.380	0.038	0.700	0.034	0.335	0.188		
437E	61,750	113,430	14.5	24.0	2,358	2,567	0.380	0.038	0.700	0.034	0.335	0.188		
Double annealed, "Berry"														
414D	75,440	133,840	13.5	20.5	3,053		0.470	0.042	0.730	0.032	0.361	0.185		
414D	74,440	140,600	10.0	15.6	3,226	3,351	0.470	0.042	0.730	0.032	0.361	0.185		
414D	73,980	133,600	15.0	21.8	3,773		0.470	0.042	0.730	0.032	0.361	0.185		
Single anneal, "Dividers"														
9155	83,980	119,010	10.5	15.8	3,000	2,952	0.490	0.036	0.710	0.037	0.310	0.175		
9155	86,220	123,090	10.0	15.6	2,904		0.490	0.036	0.710	0.037	0.310	0.175		
79-D	61,660	105,750	19.0	48.4	3,810		0.315	0.039	0.540	0.026	0.306	1.680	0.810	
79-D	62,400	105,800	17.0	31.9	3,790		0.315	0.039	0.540	0.026	0.306	1.680	0.810	
79-D	64,420	106,700	17.0	35.2	3,790	3,831	0.315	0.039	0.540	0.026	0.306	1.680	0.810	
79-D	63,930	105,270	18.0	36.2	3,478		0.315	0.039	0.540	0.026	0.306	1.680	0.810	
905C	65,920	103,670	19.0	39.9	4,287		0.315	0.039	0.540	0.026	0.306	1.680	0.810	
905C	69,500	115,670	16.5	34.0	3,514		0.372	0.038	0.650	0.015	0.277	1.930	1.050	
905C	70,420	114,350	15.5	29.0	3,889		0.372	0.038	0.650	0.015	0.277	1.930	1.050	
905C	73,360	113,090	18.0	39.2	3,562	3,818	0.372	0.038	0.650	0.015	0.277	1.930	1.050	
905C	65,420	113,500	16.5	35.2	4,354		0.372	0.038	0.650	0.015	0.277	1.930	1.050	
905C	70,740	111,400	13.5	29.3	3,772		0.372	0.038	0.650	0.015	0.277	1.930	1.050	

These tests were made on a Turner and Landgraff machine with a throw of 1/4 inch and a speed of 760.

inter-united, is liable to deteriorate rapidly, or crystallize under the fatigue of continued reversals of stress. The data were gathered with the view of determining the results of impact or fatigue upon steel of different carbon compositions which had been annealed thoroughly in commercial foundry practice.

WHAT THE RESULTS SHOW

The results in the table show that the static results are practically what could be expected from the different chemical compositions, yet the dynamic results prove that even though the chemical analyses are approximately the same in several cases, nevertheless the number of impact stresses are different, due as far as experiments have indicated, to the mechanical energy dissipated during a cycle of stress. It would seem that the lost energy must be transformed into heat, that there must be some form of internal friction in the material that causes wear and structural damage to occur, and that if the action is continued long enough the material will be ruptured. It seems reasonable to consider the amount of structural damage during a cycle of stress to be proportional to the energy transformed into heat, or in other words, to the area of the hysteresis loop. The shape of this loop re-

mains similar to the shape developed under early impact of stress.

A formula which assumes that the same destructive action which occurs under high stress will continue to act with diminished intensity under low stresses, has some indirect evidence in its favor and is a safer guide than a fixed endurance limit below which destructive action is assumed to cease.

An attempt to chart curves from the tabulated results, using the carbon contents, elastic limits and ultimate tensile strength as the basis was unsuccessful. It was impossible to plot a curve from data obtained from material of such a narrow range.

IMPORTANCE OF DYNAMIC STRAINS

I do not believe that sufficient importance is assigned to dynamic strains in steel. The object in testing steel is to secure a product which will give longer life in the service in which it is used. Practically the only tests made are static, and while they definitely determine the efficiency of the steel in resisting severe strains, experience has shown that the strength of the steel does not definitely determine its ability to resist fatigue; and I am convinced that more failures result from the innumerable minor vibratory strains than from those which are more severe.

Labor Troubles Continue in New England

Providence and Worcester the Principal Industrial Centers Becoming Involved in the Past Ten Days—Statement of Position by Worcester Manufacturers

On Sept. 20 about 2500 employees walked out from the shops of the Brown & Sharpe Mfg. Company, Providence, R. I., after the company had refused their demands. These demands were for an eight-hour day without reduction of pay, recognition of the union, reinstatement of men recently discharged for union activities, time and a half for overtime with double time for all work after midnight, Sundays and holidays, and conferences with shop committees of employees over grievances which may be settled by arbitration in default of agreement.

In a statement dated Sept. 23 and addressed to present and former employees of the Brown & Sharpe Mfg. Company, the company says, after referring to the strike as "an incident in the Dumba campaign" and as an effort to bring the plant "under the domination of the union":

Because the makers of firearms and ammunitions are willing to run their plants on an eight-hour schedule, or on a twenty-four-hour schedule in three shifts of eight hours each, this is no reason why the makers of machine tools should do the same. The former is a boom business, which will in time flatten out, doubtless as suddenly as it has come, and will leave its shops deserted.

We are engaged in our regular business of making machine tools and supplies, contemplating lean periods as well as brisk, when even an eight-hour day may be impossible because of lack of business. The machine-tool business is subject to the laws of competition in a way that firearms and ammunition in these feverish war times are not. We refuse to believe that an eight-hour day is an economical proposition in the immediate future. Our regular schedule of fifty-five hours per week, arranged in ten-hour periods for five days, and a five-hour period on Saturday so as to provide for a half holiday, is in our opinion a fair schedule. We wish all of our present and former employees to know:

1. That the company is firm in its decision to continue its regular working schedule of fifty-five hours per week.
2. That the regular system of paying the market rate of wages for each kind of labor, with every opportunity for job work, will be continued.

3. That the system of individual and confidential dealing between employer and employee in matters of wage will be continued.

4. That the company will continue to operate its business without dealings with labor unions, shop committees or walking delegates.

5. That the company will assist any employee in prosecuting to the full extent of the law any person engaging in assault, or uttering threat, against any of our employees because of the fact of his following his lawful occupation.

6. That the fact of the making of engagements to deliver machine tools will force the company to accede to the union demands, as has been claimed by union agitators, is absolutely untrue; the occurrence of the strike automatically releases the company from the engagements to make such deliveries. Notices of the strike having occurred have already been sent to parties interested in our product, the same making plain to them that delayed deliveries are to be expected, following the strike.

7. That the statement repeatedly made to our employees by union officials that the company would parley with the strike demands or union threats is a falsehood. It expresses nothing more than the hopes of those who make it; to some of our employees it has been a snare and a delusion.

8. That the continued remaining from work means not only the loss of wage in a hopeless and foolish undertaking, but the discharge of the workman himself; a man who refuses to work has no claim to remain on the rolls of the company.

9. That a man once discharged will regain his place only on making re-application in the regular way.

In conclusion: The company will welcome back to work all employees of good will with whom we can loyally cooperate as in past years.

When the striking workmen lined up for their time slips on the day following the walk-out, the attitude of the company was made plain, as each man received the regular yellow discharge slip of the company bearing these words—"Discharged. Reason, strike." A few days after the trouble began, an official statement of the company announced that 3208 of the 5500 employees were at work. About 700 of the men returned the day after the strike was called.

The Rhode Island Branch of the National Metal

Trades Association at a meeting Sept. 23 adopted the following resolutions:

Whereas, The strike recently inaugurated at the plant of the Brown & Sharpe Mfg. Company is a most evident attempt to impose upon the manufacturers of Providence and the State of Rhode Island the evils of union domination; and whereas, the condition of labor in the district is generally known to be fair and equitable to the workers in our industries; and whereas, the schedule of working hours generally practiced is reasonable and the times do not warrant any curtailment of output or working hours, particularly in view of the recent business depression; therefore be it

Resolved, That the Rhode Island Branch of the National Metal Trades Association emphatically indorses the attitude and action of the Brown & Sharpe Mfg. Company as expressed in its letter to its employees as published in the local press of to-day; be it further

Resolved, That we reaffirm our adhesion to that provision of our Declaration of Principles that inasmuch as we, as employers, are responsible for the work done in our shops, we, therefore, must determine what persons are competent to perform the work and the conditions under which the work shall be done.

On Sept. 20 about 700 men walked out of the plants of the Reed-Prentice Company, Worcester, Mass., after similar demands had been refused. On Sept. 23 they were joined by about 275 men from the shop of the Whitcomb-Blaisdell Machine Tool Company. It is expected that several more plants will be involved this week, as the manufacturers are strongly organized and have expressed a determination to stand together.

The statement of the Worcester Branch of the National Metal Trades Association, issued Sept. 25, is the most comprehensive summary of the attitude of most of the New England machine-tool builders and other employers that has yet appeared. It is in part as follows:

Why do the National Metal Trades Association members oppose the demands of the labor unions?

Many of our members have been asked this question and without doubt many citizens of Worcester have had the same thought. This is our answer:

1.—Because the business conditions under which this demand is made are exceptional and temporary and will cease when the war demand has ceased.

2.—Because the present conditions are, essentially, conditions of over-production. When the war demand for munitions ceases the equipment now being installed will be idle and in great measure come upon the market as second-hand machinery.

3.—Because the tariff law enacted by the last Congress reduced the duty on machine tools. The great machine works of England and Germany have not been destroyed in the war and will not be. When the war ceases, these shops, busy now turning out munitions, will resume their normal activity.

4.—Because reducing wages causes strife, misunderstandings, and often suffering. We think it far better and absolutely fair to our machinists to pay a war bonus on war business so long as it lasts, leaving the hours of labor and the rates of wages to be settled after the war demand is past.

5.—Because the machinists' trade is a steady occupation under protected, established and healthful conditions; not therefore comparable to the work of carpenters, plumbers, painters, masons or other seasonal occupations.

6.—Because for us to change conditions at the demand of an outside body of men means the ultimate control of our business by the same body.

7.—Because the arbitrary reduction of working hours asked for would call for an immediate increase of our manufacturing plants by approximately 20 per cent. When the war demand is past the permanent additional overhead charges would be a burden which would be extremely difficult to bear.

8.—Because we know absolutely, from the statements of men now on strike, that they are not out because they are dissatisfied with present conditions or pay, but because they know, if they continue working during a strike, they will suffer socially and, they fear, personally.

9.—Because any artificial cost added to our product, with the added freight and other charges inevitable to our extreme eastern location, would effectually prevent us from successfully competing with like products made in the West.

10.—Because we believe that wages, hours of labor, and every other factor which enters into the cost of our product should be governed by the law of supply and demand and not by feverish agitation and unconsidered action on the part of a limited body of men acting under excitement.

11.—Because we esteem the orderly development of our great industries to be of paramount importance to our cities; that our own people know better what is wise and possible than any outside body, however wise or powerful.

12.—Because the demand made upon us does not express the real purpose of the organizers, which is the ultimate union control of our industries. We do not intend to submit to such control. Rather, we should prefer the men should remain on strike and, if necessary, to close our factories.

Portable Punch for Channel Irons

A portable punch for use in the cutting of holes in channel iron has been brought out by the W. A. Whitney Mfg. Company, Rockford, Ill. In general the construction of this punch is the same as the maker's No. 2



Punch with Enlarged Opening to Allow for Handling Channels and Angles

punch. The punches and dies and the other small parts of this new punch are interchangeable with the No. 2 style, the only difference between the two being in the drop forged lower jaw, which has an opening back of the die socket, thus permitting the channels and angle irons to be pushed through from the side and punched in the web between the flanges.

The punch is supplied with punches and dies ranging from $\frac{1}{8}$ to $\frac{1}{2}$ in. in diameter, the difference between the successive sizes being $\frac{1}{32}$ in. The capacity of this new punch is a hole $\frac{1}{4}$ in. in diameter through $\frac{1}{2}$ -in. iron, and it is possible to punch a hole in the center of a 4-in. channel, having flanges $1\frac{1}{2}$ in. wide.

A Wage Premium Calculator

A contrivance for calculating premiums in wage payments, a device taking the form of a circular slide rule, has been put on the market by John Davis & Son, Ltd., Derby, England, from designs of H. W. Horsman.

The accompanying illustration will give an idea of the machine. It consists of two wheels held together by a spring. Both can be rotated either together or independently. Each wheel is calibrated in hours from 1 to 100, with quarter hours up to 50 and half hours from 50 to 100. Besides the hour figures there is an extra set in red on one of the wheels to give percentages. In using the calculator, the figure representing the actual time spent is placed opposite the figure that corresponds to the limiting time and the slide or pointer indicates the percentage of difference between the readings.



Modified Slide Rule for Facilitating Premium Calculations

The Asbestos Protected Metal Company, Pittsburgh, has moved its Detroit office to 2011 Dime Bank Building.

Working of Canada's Anti-Dumping Law

Its Provisions in Detail Proposed for Adoption in the United States—Special Added Duty Limited to 15 Per Cent of Value

WASHINGTON, D. C., Sept. 28, 1915.—In view of the widespread interest in the possibility of the adoption by Congress of an anti-dumping clause as an amendment to the Underwood-Simmons tariff act, a matter that has received much attention at the hands of Secretary Redfield, the Department of Commerce is about to issue a pamphlet embracing the text of the clause and the regulations thereunder now in force in Canada, together with comments upon the practical operation of the provision. The first practical anti-dumping regulation was adopted by the Canadian Government and has since served as a model for similar provisions in the tariffs of Australia, British South Africa and in certain other foreign countries. Those who have given attention to the subject in connection with its recent revival here are making a study of the Canadian law and it appears to be the best opinion that if such a provision is enacted as a modification of the present tariff, the Dominion law will be closely followed. When the Underwood-Simmons tariff bill was pending in Congress a movement to secure the incorporation therein of an anti-dumping clause proposed the adoption of the Canadian provision verbatim and with the understanding that the administrative regulations would also be adopted by the Treasury Department for the enforcement of the law.

DUMPING PENALTY NOT OVER 15 PER CENT

The text of the existing dumping clause in the Canadian tariff was revised in 1907, when its chief provision was made to read as follows:

In the case of articles exported to Canada of a class or kind made or produced in Canada, if the export or actual selling price to an importer in Canada be less than the fair market value of the same article when sold for home consumption in the usual and ordinary course in the country whence exported to Canada at the time of its exportation to Canada, there shall, in addition to the duties otherwise established, be levied, collected and paid on such article, on its importation into Canada, a special duty (or dumping duty) equal to the difference between the sale selling price of the article for export and the said fair market value thereof for home consumption; and such special duty (or dumping duty) shall be levied, collected and paid on such article although it is not otherwise dutiable.

In order that it shall not be possible to increase indefinitely the cost of imported merchandise by the addition of a special or dumping duty, a proviso is incorporated in the law to the effect that "the said special duty shall not exceed 15 per cent ad valorem in any case." The 15 per cent increase, it should be noted, is calculated upon the value of the goods and is in addition to the duty provided by the regular schedules of the tariff law. It is not merely increasing the duty by 15 per cent, as has been erroneously stated in certain discussions of this interesting question.

Another proviso of the law contains the following stipulation:

That the following goods shall be exempt from such special duty, viz.: (a) Goods whereon the duties otherwise established are equal to 50 per cent ad valorem; (b) goods of a class subject to excise duty in Canada; (c) sugar refined in the United Kingdom; (d) binder twine or twine for harvest binders manufactured from New Zealand hemp, istle, or tampico fiber, sisal grass, or sunn, or a mixture of any two or more of them, of single ply and measuring not exceeding 600 ft. to the pound.

The enforcement of the original anti-dumping clause in the Canadian tariff developed certain conditions which were not provided for and as a result in a subsequent revision an additional proviso was made, as follows:

That excise duties shall be disregarded in estimating the market value of goods for the purposes of special duty when the goods are entitled to entry under the British preferential tariff.

(2) "Export price" or "selling price" in this section shall be held to mean and include the exporter's price for the goods, exclusive of all charges thereon after their shipment from the place whence exported directly to Canada.

(3) If at any time it appears to the satisfaction of the Governor in Council, on a report from the Minister of Customs, that the payment of the special duty by this section provided for is being evaded by the shipment of goods on consignment without sale prior to such shipment, the Governor in Council may in any case or class of cases authorize such action as is deemed necessary to collect on such goods or any of them the same special duty as if the goods had been sold to an importer in Canada prior to their shipment to Canada.

(4) If the full amount of any special duty of customs is not paid on goods imported, the customs entry thereof shall be amended and the deficiency paid upon the demand of the collector of customs.

(5) The Minister of Customs may make such regulations as are deemed necessary for carrying out the provisions of this section and for the enforcement thereof.

(6) Such regulations may provide for the temporary exemption from special duty of any article or class of articles, when it is established to the satisfaction of the Minister of Customs that such articles are not made or sold in Canada in substantial quantities and offered for sale to all purchasers on equal terms under like conditions, having regard to the custom and usage of trade.

(7) Such regulations may also provide for the exemption from special duty of any article when the difference between the fair market value and the selling price thereof to the importer as aforesaid amounts only to a small percentage of its fair market value.

FREE LIST ARTICLES NOT EXEMPT

The general regulations for the enforcement of the dumping clause require that all invoices, certified and delivered at the custom house with the bills of entry for all imported goods, shall contain a sufficient and correct description of the goods, and in respect of all goods sold by the exporter shall show in one column the actual price at which the articles have been sold to the importer, and in a separate column the fair market value of each article as sold for home consumption in the country of export. The price and value of goods in every case are required to be stated as in condition packed ready for shipment at the time when and at the place whence the goods were actually exported directly to Canada. When the value of goods for duty purposes is determined by the Minister of Customs under the provisions of the customs act, by reason of the goods being exported or imported under unusual conditions, the value so determined must be held to be "the fair market value thereof." The regulations specially provide that the goods of a class or kind made in Canada are subject to special duty when sold for exportation to Canada at a less price than for home consumption in the country of export, whether such goods be otherwise free of duty or subject to specific or ad valorem duties, with the exceptions stated in clause 6 of the tariff above quoted. In other words, the placing of an article on the free list does not remove it from the protective influence of the dumping clause. Such articles are subject to the special duty equal to the difference between the selling price of the article for export and the fair market value thereof for home consumption in the country of production, subject to the provision that such increase shall not exceed 15 per cent ad valorem. As applying generally to the entire free list of a tariff act, therefore, the Canadian dumping clause imposes a flat countervailing duty of 15 per cent ad valorem.

A 5 PER CENT MARGIN

Several years' experience in the enforcement of the dumping law and regulations convinced the authorities that a fruitful source of contention and litigation with reference to the special duty was the fact that the countervailing penalty could be assessed upon goods as to which the difference between the actual price and fair market value did not exceed, say, 1 per cent. In such cases it was extremely difficult to prove the "fair market value." Hence a few months ago the Canadian Government adopted a new regulation providing that the dumping duty is not to apply when the difference between the fair market value and the selling price of the goods to the importer in Canada does not exceed 5 per cent of their fair market value, provided that the whole difference shall be taken into account for countervailing purposes when exceeding 5 per cent. It was further provided that "dumping duty under the customs tariff shall without exemption allowance apply to articles of a class or kind made in Canada when admitted free of ordinary duty and shall also without exemption apply to round rolled wire rods of iron and steel." Articles of merchandise for use as samples for the sale of similar goods are to be admitted without special or dumping duty, subject, however, to such ordinary duties as may apply under the terms of the tariff law.

Many controversies have arisen under the dumping clause concerning importations of goods the wholesale foreign market value of which has changed after purchase, but before actual importation. To meet this condition a regulation has been adopted to the effect that "the amount of any advance in the market value of goods between the time of their purchase by the importer and the date of their exportation to Canada shall not be subject to special duty, provided the goods have been exported in the usual course and the actual date of purchase established to the satisfaction of the collector by contracts or other sufficient documents produced for his inspection and attested to; provided, however, in respect of goods subject to an ad valorem duty, that the ordinary duty shall be collected (as heretofore) on the fair market value of the goods as at the time of their direct exportation to Canada."

"FAIR MARKET PRICE" A CREDIT BASIS

It has also been found necessary to provide a rule for comparing "fair market value" with "export price." This rule stipulates that in computing the difference for special-duty purposes between the "fair market value" in the country of export and the "selling price to the importer in Canada," the fair market value of goods is to be estimated on the usual credit basis, except where the article is universally sold in the country of export for cash only, in which case the fair market value is to be estimated on a cash basis, provided that a bona fide discount for cash, not exceeding 2½ per cent, when allowed and deducted by the exporter on his invoice, may be allowed in estimating the fair market value of goods for duty purposes. As illustrating the operation of this rule the Canadian customs code cites the following example:

Machinery sold for home consumption at \$100 on credit, subject to 2½ per cent cash discount, would not be liable to special duty if sold to a purchaser in Canada for \$93 cash, as the "difference" does not exceed 5 per cent after raising the cash price (\$93) by 2½ per cent to its credit equivalent.

In the enforcement of the dumping clause the Canadian customs department has accumulated a considerable mass of information in regard to the prices of many classes of commodities and is often able to determine the fair market value of merchandise, but hearings are usually granted by the commissioner of customs to dissatisfied parties and a special agent is sometimes sent to make additional investigations if there appears to be any ground for believing that the department has been misinformed as to the home market value of merchandise. When the invoice shows the purchase price to be the same as the fair market value, but complaint is made or suspicion is aroused, a special agent is directed to make an investigation to ascertain the market value in the country of production, and if the seller of the merchandise is in the

United States the special agent often goes to his place of business and asks to see his books, price lists, etc. Such requests are almost universally complied with, for the obvious reason that in the case of refusal the commissioner of customs is liable to assess a countervailing duty on the goods in question.

EXPENSE NOT PROHIBITIVE

According to the information of officials here, the Canadian law has worked extremely well and has proved a distinct benefit to Canadian industries. In the case of Australia and British South Africa similar provisions are said to have been occasionally invoked, but not so often as in Canada. The reason is obvious. Domestic manufacturing establishments competing with imported goods are by no means relatively so numerous either in Australia or Africa as in Canada, but it is a well-known fact that in Australia the dumping duty has been very advantageously invoked in a limited number of industries.

The criticism has been heard here that the adoption of a dumping clause as an amendment to the Underwood-Simmons' law would add greatly to the labor of administering the tariff and collecting the duties under existing schedules. The experience of Canada demonstrated that while at the outset there was a considerable increase in the volume of work devolving upon the commissioner of customs, in a comparatively short time importers learned that to expedite the liquidation of their entries it was necessary to observe the regulations closely and furnish the authorities with all necessary data for calculating the countervailing duties. With such data before them the officials were able to handle special duty entries quite as expeditiously as ordinary entries.

W. L. C.

Recovering the Acid from Waste Pickle

An invention in connection with pickling iron and steel, which by regenerating the waste pickle liquor permits of its being used repeatedly, is covered by a patent (U. S. 1,146,071—July 13, 1915) granted to A. F. Hoffman, Farmers Bank Building, Pittsburgh. A preliminary reference to this process was made in THE IRON AGE of Jan. 21, 1915.

The strength of the sulphuric acid generally used to pickle iron and steel, the inventor says, is from 2½ to 15 per cent, the average being 4 to 8 per cent. When the acidity has fallen to 2 per cent or less the waste liquor is ordinarily thrown away. The patentee draws off this liquor into a suitable settling tank when the strength has dropped to about ½ to 2 per cent free H₂SO₄. It is allowed to stand for some time to settle, the supernatant liquor being then drawn off; or the original liquor may be filtered. The solution is aerated by allowing it to trickle down a tower up which air circulates in order to oxidize most of its ferrous sulphate to ferric sulphate. About 95 per cent of the iron will readily be oxidized to ferric sulphate. The aerated liquid is then boiled to precipitate a large amount of the iron as basic ferric compounds which may be calcined, forming a good pigment or polishing powder. The boiling also liberates a considerable amount of free acid. This hot liquid is filtered and decanted while hot to separate free acid from the precipitate. To bring up the strength to the desired acidity a small amount of sulphuric acid may be added. It is then ready to use again in pickling.

While the regenerated liquor always contains considerable iron, it is claimed this does not injure it for pickling purposes, but rather improves its value, since the hydrogen liberated by the pickling process reduces the ferric sulphate present to ferrous sulphate, liberating an additional quantity of free acid.

The Manitowoc Shipbuilding & Dry Dock Company, Manitowoc, Wis., has been awarded a contract by the United States Government for constructing complete a 1000-ton vessel for the coast and geodetic survey in Pacific coast and Alaskan waters. It will be equipped with oil-burners. The contract price is \$189,000. It is to be delivered Sept. 15, 1916.

ESTABLISHED 1855

THE IRON AGE

EDITORS:

A. I. FINDLEY

GEO. W. COPE

W. W. MACON

CHARLES S. BAUR, Advertising Manager

Published Every Thursday by the DAVID WILLIAMS CO., 239 West Thirty-ninth Street, New York

W. H. Taylor, Pres. and Treas.

Charles G. Phillips, Vice-Pres.

Fritz J. Frank, Secretary

M. C. Robbins, Gen. Mgr.

BRANCH OFFICES—Chicago: Otis Building. Pittsburgh: Park Building. Boston: Equitable Building. Philadelphia: Real Estate Trust Building. Cleveland: New England Building. Cincinnati: Mercantile Library Building.

Subscription Price: United States and Mexico, \$5.00 per year; single copy, 20 cents; to Canada, \$7.50 per year; to other foreign countries, \$10.00 per year. Entered at the New York Post Office as Second-class Mail Matter.

How Much More Pig Iron? •

Consumers of pig iron are asking how many idle blast furnaces are likely to blow in if the market continues to advance. Very widely there is discussion as to the relation between the present output of pig iron and available blast furnace capacity. All such discussions appear to start with the premise that present consumption of pig iron will be maintained over a period of months and is likely to increase.

Over and over the question has been canvassed, What is the pig-iron producing capacity of the United States? The answer, if it has been intelligent, has generally been that while there exists a theoretical capacity in excess of, say, 40,000,000 tons a year, potential or available capacity must be reckoned in the light of a number of qualifying factors. One of these is the market price of pig iron. Some furnaces can only run on a high market. Other considerations are ability at a given time to collect an organization to man a furnace that has been long out of blast and ability to secure a sufficient supply of ore, coke and other raw materials.

THE IRON AGE carries 416 furnaces on its list of coke and anthracite stacks. None of these have been formally abandoned, but it is quite certain that 50 of them will never run again and the uncertainty about 40 or 50 more resolves itself into the practical certainty that most of them would be operated only on such a movement as the trade has not seen since 1906.

Some light will be thrown on the possibilities of the present situation by looking at what happened in the second half of 1912. That was the last major movement in the pig-iron market. Prices advanced rapidly and every furnace that could be got in shape was blown in. On Aug. 1 of that year 247 furnaces were in blast. At the beginning of the present month, or three years and one month later, 249 furnaces were in blast. The capacity of the 247 furnaces on Aug. 1, 1912, was 78,650 tons. Plant improvements and the better practice of the past two years gave the 249 (only two more) furnaces in blast Sept. 1, 1915, a daily capacity of 91,075 tons. It is interesting to note that pig-iron prices on Aug. 1, 1912, were not far from those of to-day. What happened in the movement of 1912 both as to price advances and the starting up of idle furnaces as prices went up is seen at a glance in the following table:

Furnaces in Blast and Pig Iron Prices, Aug. 1, 1912, to Apr. 1, 1913, Compared with Furnaces in Blast and Prices in September, 1915.

1912	No. in Blast	No. 2 Fdy. Birmingham	No. 2 Foundry, Chicago	No. 2X, Buffalo	Basic, Pittsburgh
Aug. 1...	247	\$11.50	\$15.00	\$14.00	\$14.40
Sept. 1...	257	12.25	15.50	15.00	15.15
Oct. 1...	266	13.25	16.50	16.25	16.40
Nov. 1...	281	14.00	17.50	17.00	17.15
Dec. 1...	282	14.00	18.00	17.00	17.40
1913					
Jan. 1...	294	14.00	18.00	17.00	17.40
Feb. 1...	298	13.50	17.50	17.00	17.25
Mar. 1...	303	13.25	17.25	16.75	17.15
Apr. 1...	293	13.00	17.25	16.25	16.90
1915					
Sept. 1...	249	11.00	13.50	14.75	15.45
Sept. 30...	...	11.75	14.25	15.25	15.95

The movement of 1912-13 reached its climax in output in February, 1913, when production was at the rate of 34,000,000 tons a year, or but little more than the rate at the beginning of the present month. It will be instructive, therefore, to note the number and location of blast furnaces which were producers in February, 1913, but were idle on Sept. 1, 1915. Having been active so recently as two and a half years ago they must be considered potential producers now. The list is as follows with estimated daily capacity:

Blast Furnaces in Operation in February, 1913, That Were Idle Sept. 1, 1915

	Total	Daily Cap. Gross Tons
New York and New Jersey: 2 Tonawanda, New York State Steel, Standish, Musconetcong	5	975
Lehigh and Schuylkill Valleys: Macungie, 1 Crane, 1 Hokendauqua, 1 Saucon, Leesport, 1 Swede, Temple	7	1,000
Susquehanna and Lebanon Valleys: 1 Paxton, 2 Bird Coleman, 1 Colebrook, 1 Steelton, Robeson, Sheridan	7	1,060
Pittsburgh District: 1 Isabella, 2 Edgar Thomson	3	1,300
Shenango Valley: 1 Farrell, Alice, Ella, Fannie, Hall	5	1,195
Western Pennsylvania: Emporium, Rebecca, Saxton	3	595
Virginia: Alleghany, Dora, Crozer, Radford Crane	4	545
Wheeling District: 1 LaBelle, 1 Bellaire	2	575
Hanging Rock District and Kentucky: Belfont, Union, Ironton, Wellston, Norton	5	900
Mahoning Valley: Niles, 1 Hubbard	2	550
Central and Northern Ohio: 1 Columbus, Franklin, Steelton, 1 Lorain, Newburg	5	1,325
Illinois and Wisconsin: 2 Calumet, 1 Federal, 2 Iroquois, 1 Bay View	6	1,670
Michigan and Colorado: Detroit Furnace Company, 1 Colorado	2	475
Alabama and Tennessee: 1 Pioneer, 1 Sloss, 3 Bessemer, Allen's Creek, Chattanooga, Cumberland, Dayton, Standard	10	1,635
Total	66	13,800

Or a capacity of 5,000,000 tons in 365 days.

Ten or twelve of the above furnaces have been blown in since the present month opened and as many more are preparing to blow in in the next few weeks. How many more of the sixty-six will become producers in the next few months depends on several uncertain factors. Some will need still higher prices. Others on the list will remain idle because of insufficient labor supply; some may remain idle because an ore supply cannot be arranged for this year. Coke should be easier to get and yet the possibility of labor shortage, due to drafts made by the war, has already appeared in some coke districts.

On Sept. 1 THE IRON AGE's figures showed production at the rate of 33,500,000 tons a year. Assuming that all these sixty-six furnaces which were active in February, 1913, but were inactive on Sept. 1, could blow in, pig iron would be produced at the rate of 38,500,000 tons a year. This compares with a record pig-iron production of 30,966,000 tons in 1913. The significant fact is that early in this month we were producing pig iron at nearly the rate reached at the height of the 1912-13 boom and still had a reserve of over sixty furnaces capable of producing 5,000,000 tons a year.

Financing the Crop Movement

A most interesting development this year is that Western farmers will be largely able to finance their crop movement through their own local banks. Washington advices state that in two of the great centers of the West conditions are so favorable that it will be unnecessary to ask for any accommodations either from the Government or from Eastern bankers for the purpose of moving the crops. The Federal Reserve agent at Minneapolis states that the Federal Reserve Bank in that city has ample resources not only to meet current demands, but also to maintain a large reserve against any emergency that may arise before the crops reach the market. The same announcement comes from the Federal Reserve agent at Kansas City.

This gratifying state of affairs has long been regarded as an eventual certainty because of the steady increase in the accumulation of capital in the West, but some of the ablest financiers of the country have been of the opinion that the financial independence of that section would hardly be attained until 1920 or thereafter. That it should have been brought about in 1915 is a matter of congratulation. The European war, with its accompanying heavy demand for grain at almost record-breaking prices, has been partly responsible for the accomplishment of this long expected achievement, but that alone would not have brought it about. The substantial annual growth of the West would have probably done so in the course of another year or two. Possibly the establishment of Federal Reserve banks may have had something to do with effecting this desirable accomplishment this year.

The agriculturalists of the South have suffered from exceptional conditions, especially with regard to cotton, so that they are not in as favorable position to finance their crops, and it will again be necessary this year to extend aid from other sections of the country. Nevertheless, the South is steadily growing stronger and the time is not far

distant when that part of the Union will also be able to meet its own financial requirements during the period of marketing crops.

Our manufacturers and merchants are vitally interested in this matter, as every year at the time of moving the crops they have had their operations hampered by a scarcity of money and at times by excessive rates of interest, due to the withdrawal of large sums for use in agricultural sections. They have been obliged to take this into consideration in making their plans for handling their business, but the ablest manufacturer or merchant has not always been able to arrange his affairs so well that he could completely avoid the pinch of tight money in the fall and winter months. It will be a great relief to general business interests when crop movements will no longer derange financial conditions.

Trade Balances and Their Settlement

It is quite evident that American securities held abroad are being much more tightly held than was generally expected in the United States in the early months of the war. There was a panic based on fears that these securities would be dumped upon us more rapidly than we could absorb them. It is one of the lessons of the war that the vision even of the experts is very short in such matters.

If foreign holders of American securities had been selling them with sufficient freedom in our markets no serious dislocation would have occurred in the exchange market and the floating of a British-French war loan in this country might have been obviated. Evidently our securities are very well thought of abroad, in relation to the prices at which they could be sold in our markets. It seems reasonable to conclude that if we were bidding higher prices there would be more foreign selling, and this would have the double effect of tending to liquidate the trade balance and of tending to place foreign investors in position to subscribe more freely to foreign war loans.

Naturally the foremost wish of the foreign governments is to take care of themselves. It is not to be inferred that one of their governing motives is to promote or preserve the soundness of economic conditions in the United States. The latter, however, is what chiefly interests the rank and file of our own people. Nevertheless, the argument advanced by the proponents of the war loan in the United States was that without such a loan gold would have to be shipped, causing inflation. That can readily be understood, and if a large influx of gold should operate to advance prices on the stock exchanges the tendency would be to encourage foreign holders of our securities to sell them to us, at higher prices than are now offered. On the surface that would not be as good for us, economically, as for us to obtain the securities at low prices. One of the great drains upon our favorable balance in the merchandise trade has been the payment of interest and dividends to foreign holders of our securities, and any reduction in such foreign holdings gives the country the equivalent of an annual revenue for the future. It does not follow that the floating of a foreign loan in the United States, even if it reduces the amount of

gold imports, will encourage the sale of our securities to us, because the floating of the loan reduces the pressure to make such sales.

The fact that needs to be emphasized at this time is that any settlement of the present exchange question is only temporary. So much has been said and written upon the subject that the long range view is more or less neglected. It is not that transient conditions have forced a situation that needs adjustment and one that once adjusted will stay adjusted. On the contrary, the entire trend of affairs is in the direction of piling up favorable merchandise trade balances month by month. Our monthly trade balance is not decreasing, while the balance that now needs adjustment is of more recent creation than seems to be universally recognized. As to the securities held abroad, the conditions are making the United States more prosperous, and thus disposing the holders to await higher and higher prices before they sell the securities to us.

The point about the merchandise trade balance is not so much that a large balance has accumulated as it is that large balances are accumulating. Such wide publicity was given to the billion dollar balance in the fiscal year ended last June that the impression would be encouraged that the balance was created by the fiscal year. It was not. From April to August inclusive last year there were unfavorable monthly balances, and the balances in September and October were below normal. While the November and December balances were large, as months go, they were not large for those months, in which normally our heavy grain exports occur. The total trade balance in the three months of October, November and December was less than the balance in the same months of the preceding year. To bring out the situation more strongly it may be cited that the trade balance in the calendar year 1914 was only \$324,348,049, against \$691,421,812 in the preceding year, and what may be regarded as a normal balance of approximately \$500,000,000.

Up to the first of this year, therefore, no abnormal situation had developed, but abnormal conditions were beginning to develop. What occurred in the first eight months of the present calendar year was that a favorable merchandise balance was rolled up of \$1,079,252,337. That showing, for these recent eight months, is vastly more significant than the billion dollar balance of the twelvemonth period ended last June.

The trend in the balance continues. The August balance, just reported, was \$120,000,000 against an average of \$135,000,000 per month in the eight months. While conditions as to exchange might tend to decrease the balance in the months following August, there is the important influence that the crop moving months are being reached, when our balances are always particularly great. In 1913, for illustration, the balance in the last four months of the year was at a rate of 85 per cent greater than that in the first eight months. It would require a great deal, therefore, to prevent our trade balance from increasing, in the next few months, over the rate shown for the first eight months of the year.

Assuming merely for comparison that the im-

port and export movement in the first eight months of the year is representative of a twelvemonth's showing, the imports have been, at the rate of \$1,725,000,000 a year, this being a trifle below the imports in the past three years but well in excess of the imports in preceding years. The exports have been at the rate of \$3,340,000,000 a year, or very far in excess of the exports in any preceding year. The large trade balance, therefore, may be taken as made almost exclusively by our heavy exports.

As the important question is what the trade balances are to be in future, and how they are to be settled, sight must not be lost of the fact that while gold imports are suggested as one of the means of settlement, such shipments have already been what in normal times would be considered tremendously heavy, the net gold imports in the first eight months of this year having been \$213,000,000, or at the rate of more than \$300,000,000 a year. This equals more than three times the United States production of gold and about nine-tenths of the normal total production outside the United States.

The trade of the future will depend quite largely upon imports of gold, in which no great increase can be expected over the rate that has obtained while the present situation in exchange has been in the making; upon the flotation of foreign loans in the United States, and upon the sale in the United States of securities now held abroad. As time passes it is distinctly possible that there may be a very considerable flotation of securities in the United States based upon foreign enterprises which we may find ourselves able to finance. To the extent that these and other influences are successful in liquidating our merchandise trade balances our exports will be encouraged; to the extent that they fail the exports will be lessened. These influences may be so successful that our exports will be even greater than they have been this year, and even if some reduction is forced they must necessarily remain very large.

Lake Ores in Demand

Estimates of the 1915 shipments of Lake Superior iron ores now range above the 45,000,000-ton mark which a month ago was considered an outside figure. The change from predictions made early in the year is only an illustration of the square reversal of judgments which developments in the iron trade have more than once compelled. The ore shipping season is drawing toward its close under conditions which make the question of ore supply and prices for the coming year of unusual interest to consumers. Two things seem practically assured: that a substantial advance over this year's prices will be paid for 1916 ore, and that contracts for next year will be closed earlier than in any year since 1912, probably before the end of 1915.

While some furnace interests whose plants are idle are seeking to buy ore now, with a view to starting their furnaces before the end of the year, the competition of grain cargoes, on which as high as 3½ cents a bushel has been paid—equivalent to about \$1.30 for ore—makes wild tonnage unavail-

able for any enlargement of the programs of ore shippers and they are finding it a sufficiently formidable task to take care of their engagements.

A factor in the reckoning that will have a bearing on output and prices for next year is the much increased shipment of Lake ores east of the Alleghenies. Foreign supplies for merchant furnaces are cut off. Eastern furnaces produced 200,000 tons of pig iron in September, representing ore requirements of 400,000 tons a month, whereas the merchant supply of Eastern iron ores is not much in excess of 125,000 tons a month. With plans for the blowing in of other Eastern furnaces, it is evident that larger buying of Lake Superior ores for that section is in prospect than has been known in years.

CORRESPONDENCE

The Shortcomings of Government Service

To the Editor: Permit me to reply to Fred J. Miller's communication on page 536 of your issue of Sept. 2, in which he comments on my criticism of post office service, and suggests that express company and other corporation service is equally open to criticism.

He asks whether there is any way of fixing the responsibility for certain occurrences in industrial organizations. I can only say, alas, no. Nobody ever lost or spoiled a piece of work. Such things always occur when everybody's back is turned. Certainly Mr. Miller has touched upon one of the great mysteries of manufacturing.

The real point of my previous communication seems to have been lost. The Government agrees to do a certain thing for a certain price. It is the Government's choice that that price is small, but it is our choice to demand that it deliver the goods. That demand we make of express or transportation companies and, in the event of their failure, collect damages. Can Mr. Miller collect any damages from the State?

My own experience demonstrates that the express and transportation companies go to great lengths to sift any complaint and their employees are far more courteous than the general run of the clerks who look out upon you from the protection of the wire cages in Government offices.

We are not interested in the identification of any employee who may be responsible for irregularities. What we want is service. This cannot be obtained under Government ownership. To make converts to Government ownership he must prove, not that conditions will be no worse but that they will be greatly improved.

H. D. MURPHY.

Jersey City, N. J., Sept. 23, 1915.

Export Sales Affecting Domestic Consumers

To the Editor: As consumers, we wish to call to the attention of American manufacturers the inadvisability of filling European orders for machine tools, steel, etc., at the expense of domestic manufacturers. Many of our manufacturers are endeavoring to buy machine tools for shell, rifle and other lines of work at this time, but are greatly delayed if not wholly prevented from taking up war business by the fact that tools are so difficult to secure and delivery is so much delayed.

It is obvious, of course, that nearly every machine sent to Europe increases competition with war munition manufacturers in this country. Exact information as to this can easily be secured by taking one particular line of work as an illustration, but it is safe to say that a medium sized turret lathe retained in this country and worked steadily instead of being exported would be the means of distributing much more than five or six times its value in wages yearly in this coun-

CONTENTS

Reducing the Fire Hazard in a Factory..... 741
German Pig Iron at High Mark for War Time..... 743
Semi-Automatic Four-Spindle Drill Press..... 744
A Collapsing Adjustable Shrapnel Tap..... 745
Points on Hardening High Speed Screw Machine Tools... 745
Mechanical Engineers Meet 746
Our Steel and Machinery Trade with the Philippines.... 747
Automatic Bevel Gear Generator..... 748
New Model of Reed & Prince Micrometers..... 750
Pneumatic Vibrator for Molding Machines..... 750
German Cast-Iron Shells..... 750
Machine for Generating Worm Wheels..... 751
Pneumatic Rock-Over Molding Machine..... 751
Properties and Uses of Military Explosives..... 752
Dynamic Properties of Steel Castings..... 754
Labor Troubles Continue in New England..... 756
Portable Punch for Channel Irons..... 757
A Wage Premium Calculator..... 757
Working of Canada's Anti-Dumping Law..... 758
Recovering the Acid from Waste Pickle..... 759
How Much More Pig Iron?..... 760
Financing the Crop Movement..... 761
Trade Balances and Their Settlement..... 761
Lake Ores in Demand..... 762
Correspondence 763
Sharp Decrease in India's Manganese Exports..... 763
The Iron and Metal Markets..... 764
W. E. Corey to Head Midvale..... 778
Pittsburgh and Nearby Districts..... 778
The Foundry Meetings 779
Large Steel Corporation Outlay..... 779
Slag and Waste Rates Attacked..... 779
International Engineering Congress of 1915..... 780
National Exposition of Chemical Industries..... 782
Contest Over Taylor System..... 783
Prices Strong in the Brass Industry..... 783
Thomas Iron Company Annual Meeting..... 783
Characteristics of Cores in Modern Molding..... 784
Personal 786
Pennsylvania Steel Company Appointments..... 786
La Belle Works to Issue Bonds..... 786
Obituary 787
Trade Conditions After War..... 787
Machinery Markets and News of the Works..... 788
New Trade Publications..... 792

try, or, in other words, would continuously draw and permanently secure for this country this much money from Europe as long as it is operated, while if exported the only advantage to the United States is the profit in the sales price of the machine.

MANUFACTURING CONSUMER.

Sharp Decrease in India's Manganese Exports

Manganese ore exports from India in June were only 1785 gross tons. In June, 1914, they were 49,602 tons. This is a decrease of 268 per cent. Compiling the official figures issued monthly, the following table gives the exports from India for the first six months of 1914 and 1915:

	1914, Gross Tons	1915, Gross Tons		1914, Gross Tons	1915, Gross Tons
January	50,900	26,950	May	71,849	21,952
February	44,950	17,316	June	49,602	1,785
March	61,917	16,131			
April	65,533	16,269	Total	344,751	100,403
			Decrease		244,348

The falling off of 71 per cent largely explains the British restrictions on ferromanganese exports and the plan to produce ferromanganese in India.

The Thomas Furnace Company, Milwaukee, Wis., whose stack was blown in early in September, is now shipping the first merchant low phosphorus pig iron to be made that far West. It is made from Mesaba Bessemer ore and is of particularly desirable analysis for the steel foundry, because of the higher manganese content than has been usual with Eastern low phosphorous irons.

The Iron and Metal Markets

MORE RAILROAD BUYING

Rail and Car Orders Growing

Upward Price Tendency Continues—Labor and Car Shortages

Signs of increasing home consumption are plainer, as the steel trade enters the last quarter of the year. The upward trend of prices is if anything more marked, and inquiry for rolled steel for the first quarter of next year is broadening. Throughout the industry the expectation of a prolonged period of prosperity is more and more the mainspring of all calculations.

The problem of the bar mills in making deliveries on home contracts and at the same time meeting the demands for war steel is growing more difficult. A Cleveland company closed this week with the Lackawanna Steel Company for 35,000 tons of bars, deliveries extending over 20 months. New orders for shell steel are coming out constantly. Additional requirements for France that will come to the mills when the present French contracts are finished in February amount to 300,000 tons.

Railroad buying is becoming a real factor just as reports of car shortages are coming up in the Middle West. Orders have been placed this week for 4000 cars, chiefly for the New York Central. From 15,000 to 20,000 cars are under inquiry, including 10,000 for an important trunk line.

Reports of labor scarcity are cropping up in the coke regions and at various points in the Central West. Higher blast furnace labor is also a factor, demands having been made on a number of furnace companies.

The New York Central has ordered 120,000 tons of rails for 1916, of which 55,000 tons went to the Illinois Steel Company, 55,000 tons to the Lackawanna Steel Company and 10,000 tons to Cambria Steel Company. The Burlington placed 15,000 tons and the Seaboard Air Line 9000 tons. The September rail bookings of the Steel Corporation have been about 140,000 tons.

Canada's Algoma mill, which has not been heard from in the domestic rail market in months, has taken the Pere Marquette rail order for 17,000 tons. There were some special features in this specification. Canadian steel makers, with large tonnages of profitable war steel crowding upon them, have sought to sublet some of their earlier export contracts in this country.

Steel billets for rolling and forging are commanding premiums of \$2 to \$3 a ton for early delivery. In the Central West forging billets have sold up to \$39, Pittsburgh mill. With the scarcity of steel so pronounced, new open-hearth capacity is being rushed to completion.

Quite generally the large steel companies have advanced to 1.40c., Pittsburgh, for bars, plates and

shapes for this year's delivery and manufacturing consumers are closing for the early months of 1916 on that basis. One Eastern plate mill has put its price at 1.45c., Pittsburgh.

The Government opened bids this week for 12,000 tons of plates, shapes and bars, chiefly plates, for various navy yards. Two Lake boats have been let lately and a number of vessels are about to be placed with seaboard and Lake shipyards.

Pig-iron buying is not heavy, but sellers are firm in holding for higher prices for 1916 deliveries. This week buying in malleable and other railroad supply lines has been more marked. The General Electric Company has placed a large part of the 32,000 tons called for in its recent inquiry, low prices coming out in western New York.

A sale of 5000 tons of Bessemer iron for Italy was made at \$16, Buffalo, representing about \$30 delivered at Genoa. Another 5000-ton lot also for Italy is pending. Ocean freights have advanced 10 to 20 shillings, as high as 70 shillings to Italy being now asked.

Alabama furnaces have advanced to \$12 for No. 2 iron for this year, but warrant iron can still be had at \$11.50. Stocks of free iron have been reduced in the South, but pig-iron output is increasing both in Alabama and Tennessee.

An advance of 50 cents a ton in Lake Superior ores for 1916 is already being counted on, as is a new high record in ore shipments for next year.

Coke prices have stiffened as several large contracts for blast furnaces for the first quarter of 1916 have come up. For the last quarter of this year \$2.25 at ovens has been paid.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type; Declines in Italics

		At date, one week, one month and one year previous			
		Sept. 29,	Sept. 22,	Aug. 25,	Sept. 30,
Pig Iron, Per Gross Ton:		1915.	1915.	1915.	1914.
No. 2 X, Philadelphia...	\$16.25	\$16.25	\$15.50	\$14.75	\$14.75
No. 2, Valley furnace...	14.75	14.75	14.50	14.50	13.00
No. 2 Southern, Cin'tl...	14.40	14.40	13.90	13.25	13.25
No. 2, Birmingham, Ala.	11.50	11.50	11.00	10.00	10.00
No. 2, furnace, Chicago*	14.25	14.25	13.50	12.00	12.00
Basic, del'd, eastern Pa.	17.00	17.25	15.50	14.00	14.00
Basic, Valley furnace...	15.00	15.00	14.50	13.00	13.00
Bessemer, Pittsburgh...	16.95	16.95	16.45	14.90	14.90
Malleable Bess., Ch'go*	15.00	15.00	13.50	12.00	12.00
Gray forge, Pittsburgh...	14.70	14.70	14.45	13.65	13.65
L. S. charcoal, Chicago...	15.75	15.75	16.25	15.75	15.75
Billets, etc. Per Gross Ton:		24.50	24.50	23.50	21.00
Bess. billets, Pittsburgh...	25.00	25.00	24.00	21.00	21.00
O.-h. sheet bars, P'gh...	25.50	25.50	24.50	22.00	22.00
Forging billets, base, P'gh	33.00	32.00	29.00	26.00	26.00
O.-h. billets, Phila.	30.00	30.00	32.00	23.40	23.40
Wire rods, Pittsburgh...	30.00	30.00	28.00	26.00	26.00

Finished Iron and Steel,		Cents.	Cents.	Cents.	Cents.
Per Lb. to Large Buyers:		1.25	1.25	1.25	1.25
Bess. rails, heavy, at mill	1.509	1.509	1.459	1.12	1.12
Iron bars, Philadelphia...	1.35	1.35	1.30	1.15	1.15
Iron bars, Pittsburgh...	1.35	1.35	1.25	1.05	1.05
Iron bars, Chicago...	1.35	1.35	1.30	1.20	1.20
Steel bars, Pittsburgh...	1.549	1.519	1.519	1.36	1.36
Steel bars, New York...	1.35	1.35	1.30	1.20	1.20
Tank plates, Pittsburgh...	1.549	1.519	1.469	1.31	1.31
Tank plates, New York...	1.35	1.35	1.30	1.20	1.20
Beams, etc., Pittsburgh...	1.549	1.519	1.519	1.36	1.36
Beams, etc., New York...	1.35	1.35	1.30	1.15	1.15
Skelp, grooved steel, P'gh	1.40	1.40	1.35	1.20	1.20
Skelp, sheared steel, P'gh	1.40	1.35	1.35	1.30	1.30
Steel hoops, Pittsburgh...	1.40	1.35	1.35	1.30	1.30

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Sept. 29,	Sept. 22,	Aug. 25,	Sept. 30,
	1915.	1915.	1915.	1914.
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh.	1.90	1.90	1.90	1.95
Galv. sheets, No. 28, P'gh.	3.50	3.50	3.40	2.95
Wire nails, Pittsburgh...	1.75	1.75	1.65	1.60
Cut nails, Pittsburgh...	1.60	1.60	1.60	1.60
Fence wire, base, P'gh...	1.60	1.60	1.50	1.40
Barb wire, galv., P'gh...	2.60	2.60	2.40	2.00

Old Material. Per Gross Ton:				
Iron rails, Chicago.....	\$13.50	\$13.50	\$12.25	\$11.25
Iron rails, Philadelphia....	18.50	18.50	17.00	14.00
Car wheels, Chicago.....	12.00	11.75	11.75	10.75
Car wheels, Philadelphia....	14.00	14.00	13.50	11.00
Heavy steel scrap, P'gh....	14.25	14.25	14.00	11.00
Heavy steel scrap, Phila....	15.00	15.00	14.00	10.50
Heavy steel scrap, Ch'go....	11.75	11.75	11.75	8.50
No. 1 cast, Pittsburgh....	13.00	13.00	13.00	11.50
No. 1 cast, Philadelphia....	14.00	14.00	13.50	12.00
No. 1 cast, Ch'go (net ton)	10.50	10.00	10.00	9.00

Coke, Connellsville,				
Per Net Ton at Oven:				
Furnace coke, future.....	\$1.70	\$1.60	\$1.50	\$1.60
Furnace coke, prompt.....	2.25	2.00	1.75	1.75
Foundry coke, prompt.....	2.15	2.15	2.00	2.00
Foundry coke, future.....	2.40	2.40	2.25	2.15

Metals.				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York.....	18.00	17.87 1/2	19.00	12.25
Electrolytic copper, N. Y....	18.00	17.75	16.00	11.75
Spelter, St. Louis.....	14.25	13.00	12.25	5.00
Spelter, New York.....	14.50	13.25	12.50	5.15
Lead, St. Louis.....	4.42 1/2	4.32 1/2	4.35	3.57 1/2
Lead, New York.....	4.50	4.50	4.50	3.75
Tin, New York.....	33.25	33.00	33.75	38.87 1/2
Antimony, Asiatic, N. Y....	28.00	27.50	28.50	9.00
Tin plate, 100-lb. box, P'gh	\$3.15	\$3.15	\$3.10	\$3.30

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 73.9c., on plates, structural shapes and sheets and 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal is 56.9c.

Plates.—Tank plates, 1/4 in. thick, 6 1/4 in. up to 100 in. wide, 1.35c. to 1.40c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated Feb. 6, 1903, or equivalent, 1/4 in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft. are considered 1/4-in. plates. Plates over 72 in. wide must be ordered 1/4 in. thick on edge or not less than 11 lb. per sq. ft. to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gage or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gages under 1/4 in. to and including 3-16 in.....	10
Gages under 3-16 in. to and including No. 8.....	15
Gages under No. 8 to and including No. 9.....	25
Gages under No. 9 to and including No. 10.....	30
Gages under No. 10 to and including No. 12.....	40
Sketches (including straight taper plates), 3 ft. and over.....	10
Complete circles, 3 ft. in diameter and over.....	20
Boiler and flange steel.....	10
"A. B. M. A." and ordinary firebox steel.....	20
Still bottom steel.....	30
Marine steel.....	40
Locomotive firebox steel.....	50
Widths over 100 in. up to 110 in., inclusive.....	95
Widths over 110 in. up to 115 in., inclusive.....	10
Widths over 115 in. up to 120 in., inclusive.....	15
Widths over 120 in. up to 125 in., inclusive.....	25
Widths over 125 in. up to 130 in., inclusive.....	50
Widths over 130 in.....	1.00
Cutting to lengths under 3 ft. to 2 ft., inclusive.....	25
Cutting to lengths under 2 ft. to 1 ft., inclusive.....	50
Cutting to lengths under 1 ft.....	1.55
No charge for cutting rectangular plates to lengths 3 ft. and over.	

Wire Products.—Prices to jobbers: Fence wire, Nos. 0 to 9, per 100 lb., terms sixty days or 2 per cent discount in ten days, carload lots, annealed, \$1.60; galvanized, \$2.30. Galvanized barb wire and staples, \$2.60; painted, \$1.90. Wire nails, \$1.75. Galvanized nails, 1 in. and longer, \$1.75 advance over base price; shorter than 1 in., \$2.25 advance over base price. Woven wire fencing, 69 1/2 per cent off list for carloads, 68 1/2 off for 1000-rod lots, 67 1/2 off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.									
Nos.	0 to 9	10	11	12	12 1/2	13	14	15	16
Annealed	\$1.65	\$1.70	\$1.75	\$1.80	\$1.90	\$2.00	\$2.10	\$2.20	\$2.30
Galvanized ...	2.55	2.60	2.65	2.70	2.80	2.90	3.20	3.30	

Wire Rods.—Bessemer, open-hearth and chain rods, \$30 to \$31.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles 3 to 6 in. on one or both legs, 1/4 in. thick and over, and zees 3 in. and over, 1.35c. to 1.40c. Extras on other shapes and sizes are as follows:

		Cents per lb.
I-beams over 15 in.....		10
H-beams over 18 in.....		10
Angles over 6 in., on one or both legs.....		10
Angles, 3 in. on one or both legs less than 1/4 in. thick, as per steel bar card, Sept. 1, 1909.....		.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail).....		.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.....		.20 to .80
Deck beams and bulb angles.....		.30
Handrail tees.....		.75
Cutting to lengths under 3 ft. to 2 ft. inclusive.....		.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive.....		.50
Cutting to lengths, under 1 ft.....		1.55
No charge for cutting to lengths 3 ft. and over.		

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Aug. 16, 1915, all full weight:

Butt Weld					
Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
1/8, 1/4 and 3/8.....	72	46 1/2	1 1/2 and 1 3/4.....	64	37
1/2.....	76	59 1/2	2.....	64	37
3/4 to 3.....	79	63 1/2	2 1/2.....	68	47
			3 1/4 to 2 1/2.....	71	52
Lap Weld					
2.....	76	60 1/2	1 1/4.....	55	36
2 1/2 to 6.....	78	62 1/2	1 1/2.....	66	47
7 to 12.....	76	58 1/2	2.....	67	49
13 and 14.....	62 1/2		2 1/2 to 4.....	69	52
15.....	60		4 1/2 to 6.....	69	52
			7 to 12.....	67	50
Reamed and Drifted					
1 to 3, butt.....	77	61 1/2	1 to 1 1/2, butt.....	69	50
2, lap.....	74	58 1/2	2, butt.....	69	50
2 1/2 to 6, lap.....	76	60 1/2	1 1/4, lap.....	53	34
			1 1/2, lap.....	64	45
			2, lap.....	65	47
			2 1/2 to 4, lap.....	67	50
Butt Weld, extra strong, plain ends					
1/8, 1/4 and 3/8.....	67	49 1/2	3/8.....	61	43
1/2.....	72	58 1/2	1.....	66	51
3/4 to 1 1/2.....	76	62 1/2	3/4 to 1 1/2.....	70	53
2 to 3.....	77	63 1/2	2 and 2 1/2.....	71	54
Lap Weld, extra strong, plain ends					
2.....	73	57 1/2	1 1/2.....	65	48
2 1/2 to 4.....	75	59 1/2	2.....	67	49
4 1/2 to 6.....	74	58 1/2	2 1/2 to 4.....	69	52
7 to 8.....	68	50 1/2	4 1/2 to 6.....	68	51
9 to 12.....	63	45 1/2	7 to 8.....	61	44
			9 to 12.....	56	39
Butt Weld, double extra strong, plain ends					
1/8.....	62	48 1/2	1.....	56	40
3/4 to 1 1/2.....	65	51 1/2	3/4 to 1 1/2.....	59	43
2 to 2 1/2.....	67	53 1/2	2 and 2 1/2.....	61	45
Lap Weld, double extra strong, plain ends					
2.....	63	49 1/2	2.....	57	40
2 1/2 to 4.....	65	51 1/2	2 1/2 to 4.....	59	45
4 1/2 to 6.....	64	50 1/2	4 1/2 to 6.....	58	44
7 to 8.....	58	40 1/2	7 to 8.....	51	33

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, f.o.b. Pittsburgh, freight to destination added, in effect from July 16, 1915:

Lap Welded Steel		Standard Charcoal Iron	
1 1/4 and 2 in.....	63	1 3/4 and 2 in.....	50
2 1/4 in.....	60	2 1/4 in.....	47
2 1/2 to 2 3/4 in.....	66	2 1/2 and 2 3/4 in.....	58
3 and 3 1/4 in.....	71	3 and 3 1/4 in.....	58
3 1/2 and 4 1/2 in.....	72	3 1/2 and 4 1/2 in.....	60
5 and 6 in.....	65	5 and 6 in.....	54
7 to 13 in.....	62		

Locomotive and steamship special charcoal grades bring higher prices.

1 1/4 in., over 18 ft., 10 per cent net extra.
2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gage, in carload and larger lots, on which jobbers charge the usual advance for small lots

from store, are as follows, f.o.b. Pittsburgh, terms thirty days net, or 2 per cent cash discount in ten days from date of invoice:

Blue Annealed Sheets	
	Cents per lb.
Nos. 3 to 8.....	1.45 to 1.55
Nos. 9 to 10.....	1.50 to 1.60
Nos. 11 and 12.....	1.55 to 1.65
Nos. 13 and 14.....	1.60 to 1.70
Nos. 15 and 16.....	1.70 to 1.80

Box Annealed Sheets, Cold Rolled	
	Cents per lb.
Nos. 10 and 11.....	1.55
No. 12.....	1.55
Nos. 13 and 14.....	1.60
Nos. 15 and 16.....	1.65
Nos. 17 to 21.....	1.70
Nos. 22 and 24.....	1.75
Nos. 25 and 26.....	1.80
No. 27.....	1.85
No. 28.....	1.90
No. 29.....	1.95
No. 30.....	2.05

Galvanized Sheets of Black Sheet Gage	
	Cents per lb.
Nos. 10 and 11.....	2.50 to 2.65
No. 12.....	2.60 to 2.75
Nos. 13 and 14.....	2.60 to 2.75
Nos. 15 and 16.....	2.70 to 2.85
Nos. 17 to 21.....	2.85 to 3.00
Nos. 22 and 24.....	3.05 to 3.20
Nos. 25 and 26.....	3.20 to 3.35
No. 27.....	3.35 to 3.50
No. 28.....	3.50 to 3.65
No. 29.....	4.25 to 4.40
No. 30.....	4.50 to 4.65

Pittsburgh

PITTSBURGH, PA., Sept. 28, 1915.

The proposed 55c. freight rate on iron and steel articles from Pittsburgh to Pacific coast terminals will not be put in effect as soon as expected. The Interstate Commerce Commission has ruled that all trans-continental lines, in making the lower through rate from Pittsburgh to the coast, must also make the rates to intermediate points proportionate to the through rate. There is, consequently, a possibility that the proposed rate may not become effective. The decision of the commission has been a decided disappointment to Pittsburgh shippers. The demand for steel products of nearly all kinds seems to be increasing, and the steel mills, especially those that are turning out war munitions, are swamped with business. The export demand for steel rounds for shrapnel, barb wire and other products is enormously heavy. An agent of a New York house was in Pittsburgh for two or three days with a reported bona fide inquiry for 300,000 tons of steel for shrapnel, but, so far as known, no part of the order was placed with local mills. Prices on Bessemer black sheets, shafting, nuts and bolts have been advanced. Coke, the last product to respond to the general upward movement in prices, has shown a material advance within a week. The local pig-iron market is dull, but prices are firm. A shortage of labor is cropping out in the coke regions, but so far has not affected the manufacturing plants. Bars, plates and shapes are nearing the 1.40c. basis and predictions are made that shapes and steel bars will be 1.50c. or higher before Jan. 1. The steel-bar mills are turning down business nearly every day on which they cannot make deliveries. The action of the railroads in coming in the market with inquiries for steel cars, rails and other supplies for delivery in first half of 1916 has materially strengthened the situation, which now looks to be assured up to July 1 at least. Probably never before in the history of the steel trade has there been as heavy demand on the mills for their products, more especially for those that go into war munitions. The scarcity of Bessemer and open-hearth billets is more acute than at any time since the European war started. A serious shortage in cars is predicted when the wheat crop starts to move, and already some of the coke plants and coal mines located along the lines of prominent railroads report they are having trouble in getting enough cars.

Pig Iron.—The local market has been quiet, as far as new demand and sales go, but prices remain very firm. We note a sale of 1500 tons of basic, 500 tons a

month for last three months of this year, at \$15, Valley furnace; also a sale of 1200 tons of No. 2 foundry for last quarter at \$14.50 at furnace. As yet there are no signs of any of the large steel companies coming in the market to buy pig iron, but it is said that several of them will have to buy iron in the near future if they keep up their present rate of steel output. We quote: Standard Bessemer iron, \$16; basic, \$15; malleable Bessemer, \$14.50 to \$14.75; gray forge, \$13.75 to \$14, and No. 2 foundry, \$14.75 to \$15, all at Valley furnace, the freight for delivery in the Cleveland or Pittsburgh district being 95c. per ton.

Billets and Sheet Bars.—Varied prices are heard of as having been paid for Bessemer and open-hearth billets for prompt shipment. One lot of about 1000 tons of open-hearth billets is reported to have been sold at \$27 for October delivery. This, however, represents a premium for prompt delivery. The new demand for sheet bars is not active, as the sheet mills are running only from 60 to 70 per cent of capacity, but there is a heavy demand for both Bessemer and open-hearth billets, which now command about as high prices as sheet bars. There is a good demand for forging billets, with prices ranging from \$32 to \$33 for ordinary carbons and \$37 to \$38 for higher carbons. In the present conditions in the steel market it is difficult to quote prices accurately, as nearly all sales depend on how soon the buyer wants the steel, quick deliveries commanding premiums of \$1 to \$2 a ton. Our quotations represent prices for billets and sheet bars for delivery over the remainder of the year. We quote Bessemer billets, \$24.50; open-hearth billets, \$25; Bessemer sheet bars, \$25, and open-hearth sheet bars, \$25.50, maker's mill, Youngstown or Pittsburgh, prices of steel at the two points being practically the same. We quote forging billets at \$32 to \$33 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take \$1 per ton extra. Axle billets are held at \$29 to \$30.

Ferromanganese.—There is a good deal of inquiry for ferromanganese and more apprehension is felt as to deliveries of English when the present stocks, which are getting low, have been worked up. Domestic 80 per cent ferromanganese is held at about \$112.50 at furnace, and it is said another stack at Dunbar, Pa., will go in on ferromanganese in October. We continue to quote English 80 per cent ferromanganese at \$100 to \$110, seaboard, with no assurances of deliveries on new contracts, while domestic is held at \$110 to \$112.50 at furnace. We note a sale of 400 lb. of ferrotungsten to a local steel interest for delivery in January, 1916, at \$5 per pound of contained tungsten. We quote Bessemer ferrosilicon as follows: Ten per cent, \$21; 11 per cent, \$22; 12 per cent, \$23; 13 per cent, \$24, and 14 per cent, \$25, all f.o.b. cars at furnace, Ashland, Ky., New Straitsville, Ohio, or Jackson, Ohio, each of these points having a freight rate of \$2 per gross ton to Pittsburgh. We quote 20 per cent spiegeleisen at \$27 at furnace. We note a sale of 2000 tons of 14 per cent Bessemer ferrosilicon at \$25 at furnace, equal monthly deliveries over the first half of 1916. We quote ferrotitanium at 8c. per pound in carloads, 10c. in 2000-lb. lots and over, and 12½c. in smaller lots. We quote ferrovanadium at \$2 to \$2.25 per pound of contained vanadium, prices depending somewhat on the size of the order.

Steel Rails.—The railroads are showing decided interest in the rail market and it is stated that several lines have asked the mills to reserve rolling space for large amounts of rails for rolling in first and second quarters of 1916. Makers expect the demand for rails next year to be much heavier than this year. The new demand for light rails is more active, the coal mining interests buying more freely than for some time. We quote standard section rails of Bessemer stock at 1.25c., and of open-hearth stock, 1.34c., f.o.b. Pittsburgh. We quote light rails as follows: 25 to 45 lb. sections, 1.25c.; 16 and 20 lb., 1.30c.; 12 and 14 lb., 1.35c.; 8 and 10 lb., 1.40c., in carload or larger lots, 5c. per 100 lb. advance being charged for less than carload lots.

Structural Material.—New inquiry is quite active. One local job involving a large amount of shapes has been closed, but details are not ready to be given out. The McClintic-Marshall Company has taken a pier for the Pennsylvania Railroad at Greenville, N. J., about 2500 tons; the Fort Pitt Bridge Works, 500 tons of bridge work for the Western Maryland, and the Massillon Bridge & Structural Company, 360 tons for a theater in Cleveland. The Carnegie and Jones & Laughlin steel companies are now quoting 1.40c. on shapes for remainder of the year delivery, but for specified work 1.35c. could be done. We quote beams and channels up to 15 in. at 1.35c. to 1.40c., f.o.b. Pittsburgh, for delivery over the remainder of this year.

Plates.—Bids are being opened to-day at Washington, D. C., for about 12,000 tons of plates, shapes and bars for boats to be built at various navy yards, and several local mills have bids in. The New York Central has placed 2000 steel gondola cars for the Pittsburgh & Lake Erie and 1500 wooden box cars for the Cincinnati Northern. The Central Railroad of Georgia has an inquiry out for 500 fruit and 500 box cars. The Erie is inquiring for 200 furniture cars, and the Baltimore & Ohio for 500 box cars. The new demand for plates is heavy and the Carnegie and Jones & Laughlin steel companies are quoting 1.40c. at mill for this year's delivery. We quote $\frac{1}{4}$ -in. and heavier tank plates at 1.35c. to 1.40c., f.o.b. Pittsburgh.

Sheets.—The new demand for sheets from automobile builders is enormously heavy, and several sheet manufacturers report that their shipments of sheets to that trade so far this year are more than double in the same period last year. The demand for blue annealed sheets is also heavy, and for Bessemer black is slightly better, but for galvanized sheets is extremely dull, probably not over 20 per cent of capacity. If the demand for galvanized sheets was normal the mills would have more business than they could handle. Effective Tuesday, Sept. 28, the American Sheet & Tin Plate Company advanced its price on blue annealed to 1.60c. for Nos. 9 and 10 gage, and to 2c. on No. 28 Bessemer black. This company states that its specifications for hot sheet and tin mill products in September were the heaviest of any similar month in its history. Minimum prices on No. 28 black sheets are 1.90c., with some of the larger mills holding for 2c. Nos. 9 and 10 blue annealed sheets are 1.50c., minimum, with the larger makers holding for 1.60c., and No. 28 galvanized ranges from 3.50c. up, depending on the mill. The new demand for galvanized is reported slightly better. We quote No. 28 galvanized sheets at 3.50c. to 3.65c.; No. 28 Bessemer black sheets, 1.90c. to 2c.; Nos. 9 and 10 blue annealed, 1.50c. to 1.60c.; No. 30 black plate, tin-mill sizes, H. R. & A., 1.95c.; No. 28, 1.90c.; Nos. 27, 26 and 25, 1.85c.; Nos. 22 and 24, 1.80c.; Nos. 17 to 21, 1.75c.; Nos. 15 and 16, 1.70c. The above prices are for carload lots, f.o.b. at maker's mill, jobbers charging the usual advance for small lots from store.

Tin Plate.—Specifications against contracts for tin plate are a little better. Leading consumers, such as the can makers and meat packers, are beginning to believe that prices next year will be higher than this year, due to the scarcity and higher prices of steel. Last fall the official price of tin plate was given out as \$3.20 per base box, but the actual prices ranged from \$3 to \$3.15, with \$2.90 named in a few cases and possibly a little less. It is pretty certain that the price for 1916 will be higher and for this reason consumers are going to specify fully on their contracts and it is expected that the mills will be busier over the remainder of this year. Already some of the salmon packers in the West have wired in asking prices for next year, but none of the mills has quoted. The export inquiry is fairly heavy, but domestic demand is dull. The American Sheet & Tin Plate Company is operating to about 89 per cent of capacity, running five days per week. Prices are firm. We quote 14 x 20 coke plates for domestic trade at \$3.15 to \$3.25 per base box, f.o.b. Pittsburgh, in small lots. There is very little domestic demand.

Wire Rods.—It is almost impossible to find rods at any price for prompt shipment. Three of the largest makers in this district are not quoting, needing their

entire product the remainder of this year for their own wire mills, and to take care of contracts made for rods some time ago. It is said that foreign inquiries now in this market, and which local rod mills will not be able to make prices on, aggregate 8000 to 10,000 tons, part being for shipment to Canada. Prices are very firm. We quote Bessemer, open-hearth and chain rods at \$30 to \$31, f.o.b. Pittsburgh. There would be no trouble in getting \$31, or even higher, for prompt shipment.

Wire Products.—The domestic demand for wire nails and wire is better. Specifications against contracts taken some time ago at \$1.60 and \$1.65 for nails are coming in better. The export inquiry for painted and galvanized barb wire is very heavy, one recent inquiry being for 8000 tons of painted and another for 30,000 tons of galvanized. Very high prices are being paid for barb wire for export shipment, and for this reason domestic prices are likely to be higher. The Anglo-Danish Commercial Company has an inquiry here for 6000 tons of barb wire for prompt shipment, but it is not believed the order will come to this city as the local mills cannot make the early deliveries wanted. Domestic prices to the large trade are as follows: Wire nails, \$1.75; galvanized nails 1 in. and longer taking an advance over this price of \$1.75, and shorter than 1 in. \$2.25. Plain annealed wire is \$1.60; galvanized barb wire and fence staples, \$2.60; painted barb wire, \$1.90; polished fence staples, \$1.90, all f.o.b. Pittsburgh, with freight added to point of delivery, terms sixty days net, less 2 per cent off for cash in ten days. Prices on woven wire fencing are 69½ per cent off list for carload lots, 68½ per cent for 1000-rod lots, and 67½ per cent for small lots, f.o.b. Pittsburgh.

Cold-Rolled Strip Steel.—The new demand is only fair, but this is because consumers are covered. Specifications against contracts are very active. On new orders \$3.10 base or higher is being quoted. Local makers of cold-rolled strip steel say they have their product sold up for the remainder of this year and have entered orders for first quarter of 1916. Export inquiry is still very active. We quote hard-rolled steel, 1½ in. and wider, under 0.20 carbon, sheared or natural mill edge, per 100 lb., \$3 to \$3.10 delivered. Extras, which are standard among all mills, are as follows:

Thickness, in.	Extras for thickness	Extras for soft or intermediate tempers	Extras for straightening and cutting to lengths not less than 24 in.
0.100 and heavier	Base	\$0.25	\$0.10
0.099 to 0.050	\$0.05	0.25	0.15
0.049 to 0.035	0.20	0.25	0.15
0.034 to 0.031	0.35	0.40	0.25
0.030 to 0.025	0.45	0.40	0.40
0.024 to 0.020	0.55	0.40	0.50
0.019 to 0.017	0.85	0.50	1.10
0.016 to 0.015	1.25	0.50	1.10
0.014 to 0.013	1.95	0.50	1.25
0.012	2.30	0.50	coils only
0.011	2.65	0.50	coils only
0.010	3.00	0.50	coils only

Skelp.—The new demand is dull, but, on account of the scarcity of steel, prices are very firm. We quote grooved steel skelp at 1.35c. to 1.40c.; sheared steel skelp, 1.40c. to 1.45c.; grooved iron skelp, 1.75c. to 1.80c., and sheared iron skelp, 1.85c. to 1.90c., delivered to consumers' mills in the Pittsburgh district.

Railroad Spikes.—Railroads are now sending in inquiries for spikes for next year's delivery, but local makers state they are not quoting so far ahead. Prices on standard railroad spikes have been advanced 10c. per keg. The spike trade this year was unsatisfactory, but the outlook is that it will be much better next year, and the spike makers believe they are entitled to more money on account of the high prices and scarcity of steel. We now quote standard sizes of railroad spikes at \$1.60, and small railroad and boat spikes at \$1.70 per 100 lb., f.o.b. Pittsburgh.

Rivets.—Foreign inquiry, originating in London, is in the market for 400 tons of rivets, on which several local makers are now figuring. The export demand is heavy and domestic orders are larger than for some time. Rivet makers have their output sold up for the remainder of this year. It is believed that steel bars

will be much higher before Jan. 1, and for this reason rivet makers are very cautious in entering orders for delivery ahead. Prices are firm, some makers holding structural rivets at \$1.65 and boiler rivets at \$1.75 minimum. We quote buttonhead structural rivets at \$1.60 to \$1.65, and conehead boiler rivets at \$1.70 to \$1.75, in carload lots, per 100 lb., f.o.b. Pittsburgh, smaller lots bringing about 10c. advance.

Hoops and Bands.—Due to the scarcity and high prices of steel, and the fact that makers of hoops are pretty well sold up for the remainder of this year, prices are higher, the minimum now being 1.40c. One mill reports that it has sold steel hoops at 1.50c. for prompt delivery. The Carnegie Steel Company is quoting bands at 1.40c., but this price is not as yet general. We quote steel hoops at 1.40c. to 1.50c., the higher price for prompt delivery, and steel bands at 1.35c. to 1.40c., with extras on the latter as per the steel bar card.

Iron and Steel Bars.—Nearly all makers of steel bars are now quoting 1.40c. for delivery this year, and predictions are freely made that the price will be 1.50c. or higher before Jan. 1. The mills are swamped with business, specifications being very active and new orders heavy. Two of the largest makers of steel bars have notified their selling agents to submit all inquiries to the home office before taking orders. The mills are so seriously embarrassed in making deliveries that free selling by agents would make the situation much worse. Export inquiry for steel rounds is very heavy, but not much is coming to local mills as they cannot make deliveries. Some sales of steel bars have been made for first quarter at 1.40c., but makers as a rule are declining to sell into next year at present. The new demand for iron bars is better. We quote steel bars at 1.35c. to 1.40c. for delivery over remainder of the year; refined iron bars, 1.40c. to 1.45c.; common iron bars, 1.35c., and railroad test iron bars, 1.45c. to 1.50c., all f.o.b. Pittsburgh.

Carwheels.—No orders have been placed lately, but the two local makers are filled up for the remainder of this year and have orders on their books for delivery running through the first half of 1916. Prices are very firm. We quote standard 33-in. freight carwheels, 6¼-in. rough bore, at \$16, and standard 36-in. passenger, the same bore, at \$22.50 per wheel, f.o.b. Pittsburgh.

Shafting.—Makers have lowered discounts two points, equal to an advance of about \$2 per ton. The new demand is very heavy and shafting makers are now sold up for three or four months ahead. It is not a question now of prices, but of getting the material, and premiums have been paid for prompt delivery. Consumers are specifying heavily and still higher prices are predicted. We quote cold-rolled shafting at 62 per cent off in carloads and 57 per cent in less than carloads, f.o.b. Pittsburgh.

Merchant Steel.—New demand is heavy and had it not been for the one very hot week this month, September would have made a record in output and shipments. As it is, these were nearly as heavy this month as in August. Prices are very strong and likely to be higher. On small lots we quote: Iron finished tire, ½ x 1½ in. and larger, 1.60c. base; under ½ x 1½ in., 1.75c.; planished tire, 1.80c.; channel tire, ¾ to 1 in. and 1 in., 2.10c. to 2.20c.; 1 x ½ in. and larger, 2.20c.; toe calk, 2.20c. to 2.30c., base; flat sleigh shoe, 1.95c.; concave and convex, 2c.; cutter shoe, tapered or bent, 2.50c. to 2.60c.; spring steel, 2.20c. to 2.30c.; machinery steel, smooth finish, 2c.

Nuts and Bolts.—The heavy domestic and export demand for nuts and bolts, together with the increasing prices for raw materials, have resulted in a further slight advance in prices. Makers report they are snowed under with orders, and heavy export shipments are regularly being made. It is not unlikely that a further advance will soon be made, possibly this week. Discounts in effect at this writing are as follows: Common carriage bolts, ¾ x 6 in., and shorter and smaller, rolled thread, 75, 10 & 10; cut thread, 75, 10 & 5; larger or longer, 75 & 5. Machine bolts with h. p.

nuts, ¾ x 4 in., and shorter and smaller, rolled thread, 75, 10, 10 & 5; cut thread, 75, 10 & 10; larger or longer, 75 & 10. Machine bolts with c. p. c. t. and r. nuts, ¾ x 4 in., and shorter and smaller, 75, 10 & 2½; larger or longer, 70, 10 & 7½. Blank bolts, 75 & 10. Bolt ends with h. p. nuts, 75 & 10; with c. p. c. and t. nuts, 70, 10 & 7½. Lag screws (cone or gimlet point), 80 & 15. Square nuts, h. p., tapped or blank, \$6 off list; hexagon, \$6.70 off; c. p. c. t. and r. nuts, tapped or blank, square, \$5.50 off; hexagon, ¾ in. and larger, \$7 off; smaller, \$7.50 off; semi-finished nuts, ¾ in. and larger, 85 & 10; smaller, 85, 10 & 10. Rivets, smaller than ½ in. in diameter, 80 & 10. All the foregoing prices are f.o.b. Pittsburgh, subject to an actual freight allowance not to exceed 20c. per 100 lb. on shipments of 300 lb. or more.

Wrought Pipe.—The new demand for iron and steel pipe remains quiet, representing no more than 60 to 65 per cent of capacity, if that much. Effective Sept. 30, all special prices on oil country goods will be withdrawn and from Oct. 1 prices in effect will be the net list out of stock and 5 per cent allowed on direct mill shipments from prevailing lists for shipment to all oil country districts. This means a slight advance in prices on nearly all kinds of oil country goods. Discounts on iron and steel pipe, especially galvanized, are being more or less shaded, depending on the order.

Boiler Tubes.—The locomotive and boiler shops are getting busier and the demand for boiler tubes is heavier than for some time. Merchant tubes are in fair demand, but not as heavy as for boiler tubes. Discounts on steel and charcoal iron tubes are more or less shaded.

Old Material.—Low phosphorus melting stock is active. Consumers of other scrap bought heavily some time ago, and, having pretty large stocks on hand, they are disposed to use up these stocks before coming in the market again to buy. The strength of the scrap market is shown in the fact that the new demand for about three weeks has been very dull, and yet prices have shown little decline. There is an embargo on scrap destined for the Pittsburgh Steel Company, Monessen, Pa. We note sales of 800 to 1000 tons of low phosphorus melting stock, also 2500 tons, at \$19.50, delivered; 800 to 1000 tons of borings at \$9.50, delivered, and about 1200 tons of turnings at about \$8.50, delivered. Dealers quote for delivery in the Pittsburgh and nearby districts that take the same rates of freight, as follows, per gross ton:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	14.25 to 14.50
Compressed side and end sheet scrap.	13.00 to 13.25
No. 1 foundry cast	13.00 to 13.25
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	12.25 to 12.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	14.25 to 14.50
No. 1 railroad malleable stock	12.25 to 12.50
Railroad grate bars	8.75 to 9.00
Low phosphorus melting stock	19.50
Iron car axles	18.50 to 19.00
Steel car axles	16.00 to 16.50
Locomotive axles, steel	19.75 to 20.25
No. 1 busheling scrap	11.50
No. 2 busheling scrap	8.50
Machine shop turnings	8.50 to 8.75
Old carwheels	13.00 to 13.50
Cast-iron borings	9.25 to 9.50
*Sheet bar crop ends	13.50 to 14.00
Old iron rails	12.75 to 13.00
No. 1 railroad wrought scrap	13.00 to 13.25
Heavy steel axle turnings	10.25 to 10.50
Heavy breakable cast scrap	12.50 to 12.75

*Shipping point.

Coke.—The coke situation has shown a decided change for the better. Five or six merchant blast furnaces are getting ready to blow in, and coke makers are anticipating a heavy demand in October. The Wisconsin Steel Company will start one stack, one West Middlesex stack will go in, also one Hubbard, one Leontonia and probably another Dunbar stack. There is a good deal of inquiry for furnace coke for last quarter and first half, and prompt furnace coke is bringing higher prices, ranging from \$1.70 to \$1.75. We note a sale of 12,000 tons of coke for delivery in the last five or six weeks of this year at \$2.25 per net ton

at oven, and another sale of 10,000 tons a month for last quarter at the same price. The new demand for foundry coke is also more active. We now quote standard makes of blast furnace coke for prompt shipment at \$1.70 to \$1.75, and on contracts for last quarter, \$2.25 per net ton at oven. On contracts for first half of 1916 delivery, coke makers are quoting from \$2.35 up to \$2.50 at oven. We quote best grades of 72-hr. foundry coke for prompt shipment at \$2.15 to \$2.25, and on contracts, from \$2.40 to \$2.50, all per net ton at oven. An Eastern furnace company recently made a contract for furnace coke on a sliding scale basis, on which shipments will start Oct. 1, and based on basic iron at \$15 per ton at Valley furnaces, will net the seller \$2.15 per net ton at oven. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended Sept. 18 as 382,467 net tons, a decrease over the previous week of about 5000 tons. A serious shortage in labor is confronting the coke regions, and it is also claimed that the coal miners and coke workers, since they are making more money, are not working as steadily as they did in the spring and summer months.

Chicago

CHICAGO, ILL., Sept. 28, 1915.

A record was approached if not actually established in the tonnage of steel booked at Chicago last week. The placing of contracts for some 75,000 tons of large rounds, squares, billets and slabs and an equal tonnage of rails points to the source of the business. The rolling of 17,000 tons of rails for the Pere Marquette appears to have been relinquished by domestic mills in favor of Algoma. New cars placed, or about to be, total 7000 in round numbers. Specifications were proportionately heavy and greatly in excess of mill capacity. In one department the mills of a leading interest are operating on a schedule 40 per cent in excess of rated capacity. In contrast, other departments are conspicuously below normal, but this is of little consequence to the mills, as steel-making capacity is absorbed to the limit of production. Demand for structural steel for other purposes is still moderate and in contrast to mill deliveries now limited to December shipment and to prices which have mounted to 1.40c., Pittsburgh. Western mills are also well sold up on open-hearth blue-annealed sheets, but some makers are seeking an outlet for Bessemer steel in this form through offers of concessions. A further advance of \$1 is being asked for black sheets, while for galvanized as many as three price bases obtain, depending on the gage. Pig iron, especially foundry grades, is steadily gathering strength, and inquiry shows a large demand still unsatisfied. Scrap is abundant, but moving slowly.

Pig Iron.—The market apparently is steadily gaining strength, and with inquiry still running into large figures a more protracted buying period is in sight than producers have enjoyed for a long time. With the exception of one lot of 500 tons of malleable, there is practically no new demand for malleable or basic, but foundry iron for next year's delivery is plentiful in quantities of 1000 to 2000 tons. Of this inquiry a considerable portion calls for iron of southern analysis, but much of this will probably go to local furnaces, as did 1000 tons of 3 per cent silicon bought by the American Brake Shoe and Foundry Company. The Birmingham price for the first half seems to be solidly bottomed at \$12.50, but for prompt shipment \$11.50 can still be done. This wide spread is probably attributable to the blowing in of additional furnaces in the South offering added capacity for the absorption of tonnage. The amount of business taken by local furnaces where the silicon specifications have favored the Southern analysis is creating something of a premium for the higher silicons and a stiffening of differentials would not be surprising. For the present, Northern iron prices are unchanged. Silvery grades have been again advanced 50c. per ton. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron,

which are f.o.b. furnace, and do not include a switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 2 to 5	\$15.75 to \$16.25
Lake Superior charcoal, No. 1	16.25 to 16.75
Lake Superior charcoal, No. 6 and Scotch	16.75 to 17.25
Northern coke foundry, No. 1	14.75 to 15.25
Northern coke foundry, No. 2	14.25 to 14.75
Northern coke foundry, No. 3	14.00 to 14.25
Southern coke, No. 1 f'dry and 1 soft	16.00 to 16.50
Southern coke, No. 2 f'dry and 2 soft	15.50 to 16.00
Malleable Bessemer	15.00
Standard Bessemer	17.25
Basic	13.75 to 14.00
Low phosphorus	24.00 to 24.50
Silvery, 8 per cent	20.00 to 20.50
Silvery, 10 per cent	20.50 to 21.00

Rails and Track Supplies.—Rail purchases last week were conspicuous, approximately 70,000 tons having been placed at Chicago. It is understood that the principal tonnage came from the New York Central Lines, while the Burlington closed for 15,000 tons. The Pere Marquette inquiry now calls for about 17,000 tons, which it is expected will go to the Canadian mill at the Soo. The specifications upon which this road is insisting are said to be unusual. The closing of contracts for track fastenings now under negotiation in connection with rail purchases is maturing slowly. For next year 1.75c. is being asked for spikes and 2.10c. for bolts. We quote standard railroad spikes at 1.65c., base; track bolts with square nuts, 2.05c. to 2.10c., base, all in carload lots, Chicago; tie plates, \$30, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, 1.25c., base, open hearth, 1.34c.; light rails, 25 to 45 lb., 1.16c.; 16 to 20 lb., 1.21c.; 12 lb., 1.26c.; 8 lb., 1.31c.; angle bars, 1.50c., Chicago.

Structural Material.—The more general appearance of quotations based on 1.40c., Pittsburgh, which runs the Chicago price up to approximately \$32 per ton, would probably be more acceptable if based upon a foundation of good business in this district. That the mills are not entirely lacking in appreciation of the burden such a price imposes is indicated in the frequent extension of arrangements with customers on the 1.30c. basis. A moderate improvement in building is noted, but contracts for fabricated steel closed last week were largely for the far West. The Kansas City Structural Steel Company took 350 tons for a hospital in that city. The Hansell-Elcock Company will supply 1500 tons for Armour & Co., for plant extensions at Chicago. The Minneapolis Steel & Machinery Company took 325 tons for a bank building at Sioux Falls, S. D. On the Pacific coast the American Bridge Company took about 1500 tons; the Western Iron Works, 600 tons, and the Llewellyn Iron Works, 500 tons. Developments in car work include the placing of 3000 by the New York Central Lines and 500 steel ore-cars by the Chicago & Northwestern, the latter with the American Car & Foundry Company. The inquiries of the Illinois Central, Wheeling & Lake Erie and Western Maryland for a total of 3850 cars, largely of steel, are still open. Delivery of structural steel from local mills cannot be had, except by fortunate circumstance, before December, and in that month only moderate tonnages can be accommodated. We quote for Chicago delivery of structural steel, from mill, 1.539c.

We quote for Chicago delivery of structural steel, out of stock, 1.90c.

Plates.—The price of plates still rules \$1 per ton below the market for shapes and bars, and mill conditions are somewhat easier with respect to deliveries. Sales for prompt shipment are noted, however, at 1.35c. and 1.40c. Pittsburgh. We quote for Chicago delivery of plates, from mill, 1.489c.

We quote for Chicago delivery of plates, out of stock, 1.90c.

Sheets.—Galvanized sheet quotations show a marked irregularity. For the heaviest gages as low as 3.05c. Pittsburgh was reported last week, while other mills are asking from a minimum of 3.20c. for the heavier gages to 3.50c. for the lighter. In volume, business is as variable as in price. Blue annealed sheets are being quoted for delivery in eight weeks and the common price is 1.55c., Pittsburgh, although 1.50c. is being done, and one interest is using the lower quotation to push its Bessemer product. Black sheets have been

advanced to a minimum of 2c., Pittsburgh. We quote for Chicago delivery from mill, No. 10 blue annealed, 1.689c. to 1.739c.; No. 28 black, 2.189c.; No. 28 galvanized, 3.689c.; heavy gages, 3.389c.

We quote for Chicago delivery from jobbers' stock as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 2.16c.; No. 28 black, 2.55c. to 2.65c.; No. 28 galvanized, 4.35c.

Bars.—Sales of large rounds are distinctly the market feature, close to 10,000 tons having been placed last week. Sizes approximating 6 in. predominated. With this business there is also buying for a like purpose of billets, large squares and slabs. Billets are increasingly scarce. Market conditions for hard steel and iron bars are unchanged. Shafting discounts are two points smaller from mill and store. We quote mill shipment, Chicago, as follows: Bar iron, 1.35c.; soft steel bars, 1.539c.; hard steel bars, 1.30c. to 1.35c.; shafting, in carloads, 63 per cent off; less than carloads 58 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 1.80c.; bar iron, 1.80c.; reinforcing bars, 1.75c. base, with 5c. extra for twisting in sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting 52 per cent off.

Rivets and Bolts.—In this market there is no general adherence to the Pittsburgh basis of 1.70c. for rivets, quotations as low as that, at Chicago, appearing in some instances, though 1.75c. is more common. In the absence of any considerable contracting in bolts, the market is not clearly defined.

We quote out of store: Structural rivets, 1.95c.; boiler rivets, 2.05c.; machine bolts up to $\frac{3}{8}$ x 4 in., 75-15; larger sizes, 70-10-10; carriage bolts up to $\frac{3}{8}$ x 6 in., 75-10; larger sizes, 70-15 off; hot pressed nuts, square, \$6, and hexagon, \$6.70 off per cwt.

Wire Products.—Specifications against wire contracts appear to be gathering size as the limitations in the production for the home market are more clearly appreciated. A seasonal improvement in fencing also enters into the reckoning as well as a general increase in building activity. Quotations to jobbers, per 100 lb., are as follows: Plain wire, No. 9 and coarser, base, \$1.789; wire nails, \$1.939; painted barb wire, \$2.089; galvanized barb wire, \$2.789; polished staples, \$2.089; galvanized staples, \$2.789, all Chicago.

Old Material.—A plentiful supply of scrap, and, for the time at least, a disposition to move it as rapidly as opportunity permits, serve to hold the market in check. Some of the irregular and unrelated values which were created in the recent advance are being adjusted to a more normal relation. Railroad offerings are not commanding the premiums that obtained during the upward movement of the market. The Illinois Central disposed of about 3700 tons last week at prices closely approaching the consumers' market. An interesting feature of this sale was the transaction involving 1000 tons of car-wheels, which brought approximately \$12. The Rock Island is this week offering 3300 tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails	\$13.50 to \$14.00
Relaying rails	19.50 to 20.50
Old carwheels	12.00 to 12.25
Old steel rails, rerolling	13.25 to 13.75
Old steel rails, less than 3 ft.	13.25 to 13.75
Heavy melting steel scrap	11.75 to 12.00
Frogs, switches and guards, cut apart	11.75 to 12.00
Shoveling steel	11.50 to 11.75
Steel axle turnings	9.75 to 10.00

Per Net Ton	
Iron angles and splice bars	\$13.75 to \$14.00
Iron arch bars and transoms	13.75 to 14.25
Steel angle bars	10.75 to 11.25
Iron car axles	15.50 to 16.00
Steel car axles	15.25 to 15.75
No. 1 railroad wrought	11.00 to 11.50
No. 2 railroad wrought	10.50 to 10.75
Cut forge	10.50 to 10.75
No. 1 busheling	9.25 to 9.75
No. 2 busheling	7.25 to 7.50
Pipes and flues	8.50 to 9.00
Steel knuckles and couplers	11.25 to 11.75
Steel springs	12.25 to 12.75
No. 1 boilers, cut to sheets and rings	8.50 to 8.75
Boiler punchings	10.75 to 11.00
Locomotive tires, smooth	11.00 to 11.50
Machine shop turnings	7.00 to 7.25
Cast borings	6.50 to 7.00
No. 1 cast scrap	10.50 to 11.00
Stove plate and light cast scrap	8.75 to 9.00
Grate bars	8.50 to 8.75
Railroad malleable	10.25 to 10.75
Agricultural malleable	9.00 to 9.50

Cast Iron Pipe.—A part of the outstanding municipal tonnage was closed last week by contractors, including 300 tons at St. Charles, Ill., but new orders to pipe makers were unimportant. We quote as follows, per net ton, Chicago: Water pipe, 4 in., \$27; 6 in. and larger, \$25, with \$1 extra for class A water pipe and gas pipe.

Philadelphia

PHILADELPHIA, PA., Sept. 28, 1915.

In both finished and unfinished steel the question of deliveries continues to be the subject of most concern to mill representatives. There is no difficulty whatever in selling billets, slabs and sheet bars if they can be had, this being also true of steel bars and large rounds. There is decided unwillingness to talk for publication regarding material for shells, but it can be stated that recent business involved many thousands of tons. Consumers of steel bars are anticipating their requirements, and there is increased inquiry for first quarter delivery. Plates continue active, but there is a lack of unanimity as to the prices obtainable, one mill stating that it finds difficulty in getting 1.35c., Pittsburgh base. The structural plants have plenty to do, but it is noticed that in a competition for 600 tons there was a wide difference in the quotations submitted. Furnace coke is active and contracts for next year have been placed at a flat price of \$2.25 per net ton at oven, while in other cases a sliding scale basis of payment has been arranged. Old material is quieter but prices are maintained.

Iron Ore.—Importations at this port in the week ended Sept. 25 aggregated 4700 tons from Cuba and 17,350 tons from Chile. The foreign ore situation is unchanged, but there are indefinite reports that there has been heavy buying by one eastern Pennsylvania interest of New York State ore.

Pig Iron.—An eastern Pennsylvania consumer has purchased something over 7000 tons of basic for delivery in the first quarter at a price which is not mentioned, but understood to be over the maximum usually quoted. Another interest is inquiring for 6000 to 12,000 tons of basic, also for first quarter. A lot of 1000 tons was sold for immediate delivery to a New Jersey consumer at \$17, delivered. In low phosphorus there is a steady movement, with sellers adhering pretty closely to \$25.50, especially those who have not much to offer. A few months ago certain stocks of low phosphorus were increasing, but they have since been diminished substantially and producers are in a comfortable position. Lebanon low phosphorus has been sold at \$20 f.o.b. Lebanon. Foundry irons are not as active as had been hoped for, but some betterment has been experienced and an optimistic view is taken of the near future. There is more inquiry, however, from the stove trade and from pipe works. A local pipe company has an inquiry out for 15,000 tons of Nos. 3 and 4 foundry for first quarter delivery. The lowest open quotation that is made for eastern Pennsylvania No. 2 X is \$16.29, delivered this year, or on the basis of \$15.50 furnace. Another quotation encountered is \$16.35 for No. 2 X, this year's delivery. For the first quarter an advance of \$1 is asked. The Pennsylvania Railroad is understood to have duplicated its purchase of a few weeks ago, when about 4000 tons of miscellaneous grades was taken. At that time the company offered to double its purchase at prices then prevailing, but sellers declined to accept the additional business and new estimates were submitted. On the new deal one firm will supply 2300 tons of foundry iron. The Baltimore & Ohio Railroad has closed for between 1500 and 2000 tons of foundry grades, which includes about 1200 tons of Virginia iron. Another sale reported is that of 1500 tons of Virginia No. 2 X for next year, on the basis of \$14 furnace, or \$16.75 delivered. For delivery this year Virginia producers are asking \$16.25 to \$16.75, delivered. Deliveries of Virginia iron are increasing, which some makers attribute more to their having a greater number of customers than to larger shipments to individual consumers. A few of the Virginia inter-

ests are committing themselves to deliveries over the first half, while others are confining their sales to the first quarter. Quotations for standard brands, delivered in buyers' yards, shipment this year, range about as follows:

Eastern Penna., No. 2 X foundry.....	\$16.25 to \$16.75
Eastern Penna., No. 2 plain.....	16.00 to 16.50
Virginia, No. 2 X foundry.....	16.25 to 16.75
Virginia, No. 2 plain.....	16.00 to 16.25
Gray forge.....	15.25 to 15.50
Basic.....	17.00 to 17.50
Standard low phosphorus.....	24.50 to 25.50

Ferroalloys.—Buying of future deliveries of 80 per cent ferromanganese continues to be reported despite the meager arrivals. The minds of consumers are seemingly eased by the reports of production in various parts of the United States, despite the fact that the aggregate of domestic ferromanganese cannot be great. Another influence of a reassuring character is the arrival here of both Cuban and Indian manganese ore, the latter coming under special license from Great Britain. The price paid is 43c. per unit, tidewater, the highest in many years. The custom house reports the arrival of 318 tons of English ferromanganese last week. For 50 per cent ferrosilicon \$73 to \$75, Pittsburgh, is asked.

Bars.—The purchases of steel rounds from local mills in the past few days aggregate many thousands of tons at a price under, but not far from, 3c. at mill, and pending inquiry indicates a large amount of additional buying of shell material. Ordinary steel bars are in steady demand, and considerable inquiry is developing for next year's delivery. One important producer cannot do better than November or December delivery. The quotation on steel bars is unchanged at 1.509c. to 1.559c., Philadelphia, on shipments this year at the convenience of the mills. Iron bars are quoted at 1.509c., Philadelphia.

Plates.—In plates there seems to be some irregularity in view of the fact that one mill whose minimum quotation is 1.609c., Philadelphia, for delivery to the end of the year, reports that it is receiving orders three times faster than they can be filled, while another maker experiences trouble in getting 1.509c. The first mill referred to is not going into next year to any great extent, but has made a few contracts for the first quarter with regular customers, and says it has been offered 1.709c. for that delivery. Orders continue to come from miscellaneous directions.

Structural Material.—It is a subject of remark that there was a difference of more than \$10,000 in the nine bids submitted to the Philadelphia & Reading Railroad for 560 tons of shapes required for the Emerald Street bridge, this city. The highest bid was \$38,350, and the lowest, submitted by the American Bridge Company was \$28,130. Most of the estimates ran from \$30,000 to \$32,900. The Pennsylvania Railroad is inquiring for a drawbridge, and its incidental machinery, to be erected at Rehoboth, Del., also for another drawbridge at Lewes, Del. Ballinger & Perrot, architects, this city, have the plans for alterations and additions to the plant of the Taylor-White Company, Camden, N. J., maker of dyes and extracts. Bids for the Philadelphia & Reading bridge over the Susquehanna River at Sunbury, Pa., will be taken Sept. 30. The Pennsylvania Armory Board has awarded to the Fidelity Construction Company, Philadelphia, the contract for the First Squadron armory, Philadelphia, requiring 600 tons. Quotations are unchanged at 1.559c., Philadelphia, minimum, and 1.659c. on miscellaneous orders. Orders for small lots out of stock are quoted \$1 to \$2 per ton higher.

Sheets.—No. 10 blue annealed sheets are active and strong at 1.759c. to 1.809c., Philadelphia.

Billets.—Makers say that the shortage of crude steel is well defined, and that both the foreign and domestic demand is sustained. A round lot of 6-in. billets will be supplied to the American Car & Foundry Company by a local mill. Re-rolling billets are quoted at \$30 and forging billets at \$38 to \$40, delivered, but prices continue irregular.

Coke.—Furnace coke is strong, following a considerable amount of activity in the last few days. One deal which was closed involves the delivery of 15,000 tons per month throughout the coming year at \$2.25 and

\$2.35 per net ton at oven, according to guaranteed quality. Fourth quarter furnace coke is quoted at \$2. Prompt foundry is quoted at \$2.30 to \$2.60 per net ton at oven, and contract foundry at \$2.40 to \$2.50. Freight rates from the principal producing districts are as follows: Connellsville, \$2.05; Latrobe, \$1.85, and Mountain, \$1.65.

Old Material.—In some commodities a lull is evident, due to consumers having covered for their immediate needs, but prices are unimpaired. Stove plate and grate bars have been sold at \$11. An Eastern mill is still ready to pay \$15 for heavy melting steel, providing that specified deliveries aggregating 5000 tons will be made. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel.....	\$15.00 to \$15.25
Old steel rails, re-rolling.....	15.50 to 16.00
Low phos. heavy melting steel scrap.....	20.50 to 20.75
Old steel axles.....	19.50 to 20.50
Old iron axles (nominal).....	22.00 to 23.00
Old iron rails.....	18.50 to 19.00
Old carwheels.....	14.00 to 14.50
No. 1 railroad wrought.....	16.50 to 17.00
Wrought-iron pipe.....	14.00 to 14.50
No. 1 forge fire.....	11.00 to 11.50
Bundled sheets.....	11.00 to 11.50
No. 2 busheling.....	9.50 to 10.00
Machine shop turnings.....	10.50 to 10.75
Cast borings.....	10.50 to 10.75
No. 1 cast.....	14.00 to 14.50
Grate bars, railroad.....	10.50 to 11.00
Stove plate.....	10.50 to 11.00
Railroad malleable.....	10.50 to 11.00

Buffalo

BUFFALO, N. Y., Sept. 28, 1915

Pig Iron.—The notable feature is a marked improvement in demand from foundries supplying castings to railroads. Inquiry is reported for a total of about 8000 tons of malleable. Approximately 12,000 tons of basic has also come before the market in addition to the heavy tonnage of foundry grades, malleable and basic, under negotiation by the General Electric Company. A portion of this iron has been placed: 5000 tons of foundry grades having been taken by a Buffalo producer. The foundries of the district are now operating at 60 to 75 per cent of capacity on the average, with quite a number running to full capacity. Shipments on contracts are moving in exceedingly large volume. The price situation is very strong and there is very little, if any, \$15 iron of any grade left in the market. We quote as follows, f.o.b. furnace Buffalo, for fourth quarter and first quarter deliveries:

Foundry of 4 to 5 per cent silicon.....	\$16.50
No. 1 foundry.....	16.00
No. 2 X foundry.....	\$15.25 to 15.50
No. 2 plain.....	15.00 to 15.25
No. 3 foundry.....	15.00 to 15.25
Gray forge.....	15.00 to 15.25
Malleable.....	15.25 to 15.50
Bessemer.....	16.00 to 16.50
Basic.....	16.00 to 16.50
Charcoal—regular grades and analysis.....	16.75 to 17.75
Charcoal—special grades and analysis.....	20.00 to 21.00

Finished Iron and Steel.—Producers are now quoting 1.40c., Pittsburgh, as the listed price for fourth quarter delivery on bars, shapes and plates. It is reported that some contracts have been taken for delivery over the first quarter, but only in exceptional instances. For the few manufacturers so covered it is stated 1.40c. has been made for requirements extending into and in some instances through the first quarter. One large selling interest is inclined to ask 1.45c., Pittsburgh, for first quarter when it opens its books for such delivery, and in one case at least business was taken at 1.40c. for fourth quarter and 1.45c. for first quarter of 1916. Warehouse prices for bars and small shapes for current delivery are 1.95c. for bars and small shapes, and 2c. for structural material and plates, f.o.b. Buffalo, with 5c. per 100 lb. additional for delivery to customer. There has been considerable inquiry for billets and galvanized wire for export, but no known sales because of the inability of the mills to supply. It is understood a number of Canadian manufacturers of wire nails contemplate the installation of barb wire machines, and one or two of them have undertaken to fill orders for export to Europe. It is also reported that one of the

smaller wire manufacturers is trying to interest capital in a new steel producing proposition which will include the construction of a blast furnace and rod mill. Large inquiry continues for reinforcing bars aggregating several thousand tons, but none of the mills is able to make prompt shipment. At least a portion of these inquiries are for quick delivery, which is causing orders to be placed with the leading deformed bar distributors who carry stocks of such bars. Fully one-half of this business going now is moving out of stock. Order is pending for 170 tons of reinforcing bars for a stock-pen building for the Dold Packing Company, Buffalo. Structural steel fabricators are in some cases working overtime, having taken all the business they can handle to the first of December. Prices for this work are stiffening. The Kellogg Structural Steel Company has 350 tons for a carhouse for the Chautauqua Traction Company, Jamestown, N. Y., and 100 tons for an addition for the McKinnon Chain Company, Tonawanda, N. Y. The Progressive Structural Steel Company has 100 tons for factory addition for Frank J. Offerman, Buffalo, and the Seneca Falls Engineering Company, Montour Falls, N. Y., has 100 tons for the Crowther Motor Car Company, Rochester.

Old Material.—The chief selling features of the week have been in heavy melting steel, in which there has been a large movement, in bundled sheet scrap and in No. 1 busheling scrap; but at no advance in prices. There has also been a fair amount of business in low phosphorus steel and in old steel axles and the price on each commodity has advanced \$1 per ton. There appears to be an oversupply of machine shop turnings and for that reason the market is somewhat weaker, but the price of last week is still holding and the aggregate tonnage sold was quite large. Borings were also in good demand, but at no advance in price. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	\$13.00 to \$13.50
Boiler plate, sheared	13.00 to 13.50
Low phosphorus steel	17.50 to 18.00
No. 1 railroad wrought scrap	12.50 to 13.00
No. 1 railroad and machinery cast	12.50 to 13.00
Old steel axles	18.00 to 18.50
Old iron axles	19.00 to 19.50
Old carwheels	12.50 to 13.00
Railroad malleable	12.50 to 13.00
Machine shop turnings	7.00 to 7.50
Heavy axle turnings	9.00 to 9.50
Clean cast borings	7.50 to 7.75
Old iron rails	15.50 to 16.00
Locomotive grate bars	9.50 to 10.00
Stove plate (net ton)	8.50 to 9.00
Wrought pipe	10.50 to 11.00
Bundled sheet scrap	9.50 to 10.00
No. 1 busheling scrap	10.00 to 10.50
No. 2 busheling scrap	8.50 to 9.00
Bundled tin scrap	10.00

Cleveland

CLEVELAND, OHIO, Sept. 27, 1915.

Iron Ore.—With the probability of a 50c. advance in prices next season, a few consumers have recently bought some additional ore which is believed to be for use next season, as they were understood to have previously covered for their requirements to the opening of navigation next year. There is some new inquiry coming for ore for furnaces not in blast which may be blown in in the next few months. Ore firms will have about all they can do in getting out the ore they have already sold and they are not seeking additional business for this year's shipment. This is partly due to the vessel situation. Vessel space is practically all taken for the remainder of the season and shippers are having trouble in finding additional vessel capacity for ore. We quote prices as follows delivered to the lower Lake ports: Old range Bessemer, \$3.85; Mesaba Bessemer, \$3.45; Old Range non-Bessemer, \$3; Mesaba non-Bessemer, \$2.80.

Pig Iron.—Cleveland selling agencies report a fair volume of small lot orders from adjoining districts, mostly in foundry iron for first half. With prospects of no further advance on foundry grades in the near future, most consumers in this territory are deferring purchases for next year. The local market is firm at \$15, at furnace, for No. 2, but foundry iron in the Val-

ley can still be had at \$14.50, although \$15 is the general asking price. A Valley interest is understood to have undersold local furnaces on some iron for Cleveland shipment, naming a price lower than \$14.50. Sales are being made in Toledo on a basis of \$14.50 for No. 2. Some new inquiries have come out for basic iron for the first quarter of next year in lots around 5000 tons. Sellers are not disposed to quote prices for this delivery. The first sales of Southern iron for first half delivery at the \$12.50 Birmingham price for No. 2 are reported. Orders for two or three lots aggregating 750 tons have been taken at this price in this market. For the last quarter \$11.50 is still being quoted. M. A. Hanna & Co. blew in their Claire furnace, Sharpsville, Pa., on Bessemer iron Sept. 24. We quote, delivered Cleveland, as follows:

Bessemer	\$16.95
Basic	15.30
Northern No. 2 foundry	15.30
Southern No. 2 foundry	\$15.50 to 16.50
Gray forge	14.75
Jackson Co. silvery 8 per cent silicon	19.12 to 19.62
Standard low phos. Valley furnace	23.50 to 24.00

Coke.—Sales are limited to small lots of foundry grades for prompt shipment. We quote standard Connelville foundry coke at \$2.25 to \$2.50 per net ton at oven for prompt shipment, and \$2.40 to \$2.75 for contracts through the first half. Standard furnace coke is held at \$1.70 to \$1.75 for early shipment and \$1.90 to \$2 for contracts through the first quarter.

Finished Iron and Steel.—Demand continues heavy and the prices on steel bars, plates and structural material have been advanced by most mills to 1.40c., Pittsburgh. Orders are being freely taken at the advanced price by mills that can make the desired deliveries. Many new inquiries for first quarter contracts are coming out. One seller is understood to have taken some business at 1.40c. for that delivery. Others are declining to quote for the first quarter. A local company, having a contract for shrapnel forgings, has bought 35,000 tons of large rounds, for delivery over the next year and a half, from a New York steel company. Smaller mills have stiffened up their prices on plates and the 1.30c. Pittsburgh price has disappeared in this market. Small lot orders are being taken at 1.40c. An Eastern mill has advanced its price to 1.50c., Pittsburgh, for this territory. The demand is improving and a local mill is filled up for several weeks. The Toledo Ship Building Company has placed orders for about 2000 tons of plates for two boats, and several additional vessels are being figured on, both for the Lakes and for the Atlantic coast trade. Structural contracts placed include 1300 tons for a building for the Standard Oil Company, taken by the Van Dorn Iron Works Company; 500 tons for addition to the plant of the Hydraulic Pressed Steel Company, taken by the Riverside Bridge Company; 1500 tons for the B. F. Goodrich Company, Akron, taken by American Bridge Company; 400 tons for the Warner & Swasey Company, Cleveland, taken by the King Bridge Company, and 600 tons for the Firestone Tire & Rubber Company, Akron, taken by the T. H. Brooks Company, Cleveland. Forging billets have sold at \$39, Pittsburgh, for delivery in this territory. Blue sheets are firmer. Some of the Ohio mills are now asking 1.60c. for No. 10. Black sheets are quoted at 1.90c. for No. 28, and galvanized at 3.65c. to 3.75c. for No. 28. Bar iron is quiet at about 1.50c. Cleveland. Warehouse prices are 1.90c. for steel bars and 2c. for plates and structural material.

Bolts, Nuts and Rivets.—Bolt and nut specifications are heavy, but as yet there is not a great deal of contracting for the fourth quarter. Prices are firmer, although shading has not entirely disappeared. Rivets are in good demand at 1.60c. to 1.70c., Pittsburgh, for structural rivets and 1.70c. to 1.80c. for boiler rivets. Bolt and nut discounts are as follows: Common carriage bolts, $\frac{1}{2}$ x 6 in., smaller or shorter, rolled thread, 75, 10 and 10 per cent; cut thread, 75 and 10; larger or longer, 75 and 5; machine bolts with h. p. nuts $\frac{3}{4}$ x 4 in., smaller or shorter, rolled thread, 75, 10, 10 and 5; cut thread, 75, 10 and 10 per cent; larger and longer, 75 and 10; coach and lag screws, 80 and 15; square h. p. nuts, blank or tapped, \$5.80 off the list; hexagon h. p.

blank or tapped, \$6.30 off; c.p.c. and t. square nuts, blank or tapped, \$5.30 off; hexagon $\frac{1}{2}$ in. and larger, \$6.75 off; $\frac{3}{4}$ in. and smaller, \$7.25 off; cold pressed semi-finished hexagon nuts $\frac{1}{2}$ in. and larger, 85 off; smaller, 85 and 10.

Old Material.—The market is inactive and a weakening tendency is apparent, although most price quotations are unchanged. There is some demand for turnings and we note one sale of 500 tons to a Youngstown mill at \$8.50 per gross ton. Borings are dull. Some steel axles have been sold for export to Italy, and this foreign demand has caused an advance of \$1 per ton. Some dealers have a large stock of steel rails that they are holding for further advance in price. Heavy melting steel is quoted at \$13.50 to \$13.75 for Youngstown shipment. Much of the scrap being sold is for future requirements, and mills are refusing to accept shipments after buying the scrap. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton	
Old steel rails	\$13.00 to \$13.50
Old iron rails	14.00 to 14.50
Steel car axles	17.00 to 18.00
Heavy melting steel	12.50 to 12.75
Old carwheels	11.50 to 11.75
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	10.00 to 10.25
Railroad malleable	13.00 to 13.50
Steel axle turnings	10.00
Light bundled sheet scrap	10.00 to 10.50
Per Net Ton	
Iron car axles	\$17.25 to \$17.75
Cast borings	7.00 to 7.25
Iron and steel turnings and drillings	6.25 to 6.50
No. 1 busheling	9.50 to 10.00
No. 1 railroad wrought	11.50 to 12.00
No. 1 cast	11.00 to 11.50
Railroad grate bars	9.00 to 9.50
Stove plate	8.75 to 9.00

Cincinnati

CINCINNATI, OHIO, Sept. 28, 1915.

Pig Iron.—Southern furnaces have gradually withdrawn their quotation of \$11.50, Birmingham basis, for No. 2 foundry iron, and are now asking \$12 for delivery through the last quarter. First quarter iron is being held firmly at \$12.50 to \$13, with the majority of makers asking the higher price. Resale iron, of which a fair tonnage is available, can still be had at \$11.50, Birmingham basis, for prompt delivery. The southern Ohio situation is stationary and firm at \$14.50, Ironton basis, for No. 2 foundry for delivery through the last quarter of this year, and \$15 for the first half of 1916. No malleable or basic iron can be had for this year's shipment, and a number of furnaces are booked to their full capacity for several months next year. These grades are quoted at \$15 to \$15.50, Ironton basis. Sales and inquiries are limited to lots rarely exceeding 200 tons, but the aggregate of sales shows a slight increase over last week. Very little silvery iron is being sold, but it is strong at \$17 to \$18, furnace, for 8 per cent silicon. A northern Illinois melter is inquiring in this market for 2000 tons of analysis iron and a northeastern Indiana manufacturer is out for 1500 tons, both for shipment after the close of the year. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	\$14.90 to \$15.40
Southern coke, No. 2 f'dry and 2 soft	14.40 to 14.90
Southern coke, No. 3 foundry	13.90 to 14.40
Southern No. 4 foundry	13.40 to 13.90
Southern gray forge	12.90 to 13.40
Ohio silvery, 8 per cent silicon	19.25
Southern Ohio coke, No. 1	16.76 to 17.01
Southern Ohio coke, No. 2	15.76 to 16.01
Southern Ohio coke, No. 3	15.51 to 15.76
Southern Ohio malleable Bessemer	15.76 to 16.01
Basic, Northern	15.76 to 16.01
Lake Superior charcoal	16.20 to 17.20
Standard Southern carwheel	26.90 to 27.40

Finished Material.—Galvanized sheets continue strong, and the minimum price of 3.50c., Pittsburgh basis, for No. 28 gage has been withdrawn by local makers, who are now asking from 3.60c. to 3.75c., with the higher price in the majority. No. 28 black sheets are quoted firmly at 2c., Pittsburgh basis. Mills are refusing to sell for extended delivery. Warehouse prices are 4.35c. for No. 28 galvanized sheets, 2.55c. for No. 28 black, and 2c. for No. 10 blue annealed. A good demand has developed in the past two weeks for

twisted reinforced concrete bars. From Cincinnati warehouse, steel bars remain unchanged at 1.90c., and small structural shapes at 2c. Warehouse prices here show a tendency to advance.

Old Material.—Steel-making scrap continues in very good demand, and shipments of this grade to mills in this territory are very heavy. Jobbing foundries are buying sparingly, preferring in a large number of cases to use low grade pig iron because it is cheaper and easier to handle. Stove foundries are barely operating, and their purchases of scrap are light. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton	
Bundled sheet scrap	\$8.50 to \$9.00
Old iron rails	12.00 to 12.50
Relaying rails, 50 lb. and up	20.25 to 20.75
Rerolling steel rails	10.50 to 11.00
Heavy melting steel scrap	10.50 to 11.00
Steel rails for melting	10.50 to 11.00
Per Net Ton	
No. 1 railroad wrought	\$9.50 to \$10.00
Cast borings	6.25 to 6.75
Steel turnings	5.75 to 6.25
Railroad cast scrap	10.25 to 10.75
No. 1 machinery cast scrap	11.50 to 12.00
Burnt scrap	7.50 to 8.00
Old iron axles	15.00 to 15.50
Locomotive tires (smooth inside)	9.75 to 10.25
Pipes and flues	7.25 to 7.75
Malleable and steel scrap	8.50 to 9.00
Railroad tank and sheet scrap	6.50 to 7.00

Coke.—Two southern Ohio furnaces are inquiring for coke requirements for the first half of next year, aggregating about 75,000 tons. Dealers here are also figuring on one lot of furnace coke from Virginia. Furnaces are refusing to pay the prices asked by coke producers, but the latter are very firm and are keeping only a sufficient number of ovens in blast to supply contracts, preferring to sell their coal direct rather than turn it into coke at lower figures than to-day's quotations. The demand for foundry coke is at a minimum, but shipments on contracts are heavy and are increasing slightly each month. Wise County and Pocahontas furnace coke is quoted at \$2 to \$2.25 per net ton at oven for prompt delivery, and foundry coke at \$2.25 to \$2.60. New River furnace coke is held at \$2.25 to \$2.50 at oven, and 72-hr. at \$2.50 to \$3.25. Connellsville furnace coke ranges from \$1.70 to \$2 at oven, and foundry coke at \$2.30 to \$2.70.

St. Louis

ST. LOUIS, MO., Sept. 27, 1915.

Pig Iron.—Considerable buying is being done quietly to avoid starting the market upward. While \$11, Birmingham, is still to be found, the most of the No. 2 Southern iron available is quoted at \$11.50, Birmingham, for last quarter, while iron for 1916 is generally obtainable only at sharply higher figures with some raggedness of quotation up to \$13 for first half delivery. Furnace representatives show little disposition to sell for advanced periods.

Coke.—Specifications are increasing and demands for delivery are somewhat more urgent, indicating that the melters are becoming more active. No new contracts, however, have been closed, but there have been some small sales of special brands for immediate consumption. Quotations continue on a parity with Connellsville and Virginia oven prices, but the local by-product figures control the situation.

Finished Iron and Steel.—Fabricators report more business each week and are getting farther behind on their contracts on structural work. Deliveries of their material are also increasingly extended. Prices are firmer and 1.40c., Pittsburgh, is the fixed figure now, with consumers apparently willing to pay the price. Light rails are in better request, from both lumber and coal interests, the former being more active than for a long time. Prices are higher. In standard rails there is an Oklahoma inquiry for about ten miles, but track fastenings are in very good demand at stiffer prices. Movement from warehouse is free, and we quote for material out of stock as follows: Soft steel bars, 1.85c.;

iron bars, 1.80c.; structural material, 1.95c.; tank plates, 1.95c.; No. 10 blue annealed sheets, 2.15c.; No. 28 black sheets, cold rolled, one pass, 2.60c.; No. 28 galvanized sheets, black sheet gage, 4.40 to 4.60c., largely subject to spelter fluctuations.

Old Material.—The scrap market, while not speculatively active, has shown a steady tone with prices well held and dealers disinclined to make any concessions. Consumption is increasing slowly, but none of the mills or foundries is in the market as yet for large future lots, their yards still being well stocked and their demand chiefly for special lots. Steel axles continue to move freely to the East for export. Light rails are in good request with prices firm, especially for heavy sections which are hard to get. No lists of importance are out, except the Vandalia for 500 tons, it being too close to the end of the month. We quote dealers' prices f.o.b. customer's works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails	\$11.00 to \$11.50
Old steel rails, rerolling	12.75 to 13.25
Old steel rails, less than 3 ft.	12.50 to 13.00
Relaying rails, standard section, subject to inspection	21.00 to 23.00
Old carwheels	10.50 to 11.00
No. 1 railroad heavy melting steel scrap	11.50 to 12.00
Shoveling steel	9.00 to 9.50
Frogs, switches and guards cut apart	11.50 to 12.00
Bundled sheet scrap	7.50 to 8.00
Per Net Ton	
Iron angle bars	\$11.75 to \$12.00
Steel angle bars	10.00 to 10.50
Iron car axles	15.75 to 16.25
Steel car axles	14.75 to 15.25
Wrought arch bars and transoms	13.75 to 14.25
No. 1 railroad wrought	10.50 to 10.75
No. 2 railroad wrought	9.75 to 10.25
Railroad springs	11.25 to 11.75
Steel couplers and knuckles	11.00 to 11.50
Locomotive tires, 42 in. and over, smooth inside	12.00 to 12.25
No. 1 dealers' forge	9.25 to 9.50
Mixed borings	6.00 to 6.50
No. 1 busheling	9.00 to 9.50
No. 1 boilers, cut to sheets and rings	7.50 to 8.00
No. 1 railroad cast scrap	10.50 to 10.75
Stove plate and light cast scrap	8.50 to 8.75
Railroad malleable	8.75 to 9.00
Agricultural malleable	7.75 to 8.00
Pipes and flues	7.25 to 7.75
Railroad sheet and tank scrap	7.00 to 7.25
Railroad grate bars	7.00 to 7.50
Machine shop turnings	7.00 to 7.50

Birmingham

BIRMINGHAM, ALA., Sept. 27, 1915.

Pig Iron.—Pig iron made in this district is selling at \$12 for spot and \$12.50 for 1916. Every phase of the changing market is upward. The leading interest with no stock on hand and well sold through the first quarter of 1916 has advanced to \$13.50 for first half, but without transacting business on that basis up to the end of last week. The company is pushed to supply itself with steel-making irons. A company having four furnaces is quoting a minimum of \$12 spot to regular customers only for small fill-in orders, is sold throughout the remainder of the year and has no additional available capacity. A maker having one furnace has advanced to \$13 spot and 1916. A furnace at Cumberland, Tenn., recently resuming, has sold its output for the remainder of the year at \$12, Birmingham, or \$13 at furnace. The situation is practically controlled by the largest foundry iron maker, which is the only one having a considerable tonnage available for the remainder of the year. Its minimum is \$12 spot and \$12.50 for 1916. A sale of over 1000 tons for immediate Mediterranean delivery at \$12.25, several thousand tons of warrants for spot delivery at \$12, 1000 tons for immediate domestic delivery at \$12 and a series of sales for first quarter of 1916 at \$12.50 featured the week. Big buyers are admittedly nervous. Active coke stacks in this district are now 22 in all. The Sloss-Sheffield Company announces the blowing in of a third Birmingham stack November 1. The Alabama Company is considering resumption at its long idle Gadsden stack, the Republic is ready to blow in its third stack at Thomas and the Tennessee nears the completion of repairs on two more Bessemer stacks. Continuance of the rise and demand for foundry iron, combined with enlarged stack capacity and improved

furnace handling, means the probability of an early monthly production in Alabama of 200,000 tons or over, as compared with a maximum of 186,000 tons in March, 1913. The September output will probably reach the latter record. One interest, with an active monthly capacity of 17,000 tons, reports shipments daily of 1000 tons. This interest booked 3000 tons of 1916 iron at \$12.50. With the leading and one other interest asking higher prices, we quote, per gross ton, f.o.b. Birmingham district furnaces for spot and 1916 delivery, as follows:

No. 1 foundry and soft	\$12.50 to \$13.00
No. 2 foundry and soft	12.00 to 12.50
No. 3	11.50 to 12.00
No. 4	11.25 to 11.75
Gray forge	11.00 to 11.50
Basic	12.00 to 12.50
Charcoal	21.00 to 21.50

Cast-Iron Pipe.—The pipe market has not been featured by large new contracts with the exception of one for 1000 tons for Kansas City. Operations continue around 80 per cent in the active water and gas pipe works, but some of the sanitary shops are shut down and none is working at over 50 to 60 per cent capacity, with the market dull. Water and gas pipe have been marked up another 50c. per ton and bid fair to go higher. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., \$22; 6-in. and upward, \$20, with \$1 added for gas pipe.

Coal and Coke.—Coal at last shows some real, if not great, improvement. The new business will go to non-furnace-owned collieries, which will stimulate independent mining operations. Coke is stronger and scarcer. The Sloss-Sheffield Company will be unable to relight beehive ovens in Birmingham and is purchasing Tuscaloosa coke. Some Virginia coke may be used at its furnaces in Florence and Sheffield. Texas points have been liberal purchasers of Birmingham coke. Relighting of beehive ovens is general. We quote, per net ton, f.o.b. oven, as follows: Beehive furnace, \$2.75 to \$3; beehive foundry, \$3 to \$3.25, with best makes at \$3.50; by-product furnace, \$2.50 to \$2.75; by-product foundry, \$2.75 to \$3.

Old Material.—There is an excellent demand for steel scrap and quite an improvement in the market for cast and stove plate. Dealers report rapid exchange of stocks from yards to consumer with altogether satisfactory conditions. Quotations have not been changed, but fewer concessions are made. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles	\$13.50 to \$14.00
Old steel axles	13.00 to 13.50
Old iron rails	12.50 to 13.00
No. 1 railroad wrought	9.50 to 10.00
No. 2 railroad wrought	8.50 to 9.00
No. 1 country wrought	8.50 to 9.00
No. 1 machinery cast	9.50 to 10.00
No. 1 steel scrap	9.50 to 10.00
Tram carwheels	9.50 to 10.00
Stove plate	8.00 to 8.50

New York

NEW YORK, Sept. 29, 1915.

Pig Iron.—Sales of foundry iron for delivery in New Jersey and metropolitan districts have not been large in the past week, but sellers are even stiffer in their ideas of prices. Foreign demand has been interesting. Italy has been in the market for Bessemer iron. A Buffalo sale reported both as 3500 tons and 5000 tons has been put through on the basis of \$16 at Buffalo, which at freights to Italy prevailing last week, from which there has been an advance of 15s. to 20s. in the past few days, would represent about \$30 delivered at Genoa. There are negotiations for 5000 tons more of Bessemer iron for Italy. Some other foreign pig iron deals are pending, but the rise in freights has caused some hesitancy in putting these through. Basic iron has sold as high as \$17.75 delivered in eastern Pennsylvania. Makers of foundry iron in Pennsylvania have advanced prices 25c. to 50c. within the week. A central Pennsylvania interest has named \$15.25 at furnace for this year's delivery, \$15.50 for the first quarter, and \$15.75 for the first half. The advance with freight added represents a delivered price of \$17.41 at Jersey City for this year. Sales by eastern Pennsylvania fur-

nace range from \$15.25 to \$16 at furnace for the last quarter. The General Electric Company is understood to have covered most if not all of its requirements represented in recent inquiries for 32,000 tons of various foundry grades, including 2700 tons of malleable and 4000 tons of low phosphorus irons. The deliveries start in October and run through the first half of 1916. The foundry iron went to western New York furnaces at prices considerably under the schedule recently quoted by Buffalo furnaces. Virginia furnaces are asking more money since recent considerable sales in New England, the present basis for the first quarter of 1916 being \$14 at furnace. We quote at tidewater as follows for fourth quarter delivery: No. 1 foundry, \$16.50 to \$16.75; No. 2 X, \$16.25 to \$16.50; No. 2 plain, \$15.75 to \$16; Southern iron, \$16.50 to \$17 for No. 1 and \$16.25 to \$16.50 for No. 2.

Ferroalloys.—Prospects are a little brighter for better shipments of British ferromanganese in October than in September. A New York representative of a British producer, which has been out of the export market since the government restrictions were put in force there two months ago, is now advised that licenses are being applied for for shipment in October. Another British representative here states that assurances from England are that October shipments will probably be better than September. What this means as to tonnage is uncertain, for September receipts and shipments are known to have been exceedingly low even for war conditions. With the constantly decreasing British imports of manganese ore the prospect of larger shipments of the alloy to this country are not regarded as encouraging. Sales of small lots are reported at \$100, seaboard, subject to the usual restrictions. They are authorized only to the end of the year. A sale of 2000 tons was recently made, but it was a merged sale of an old \$36-contract with one at \$100, seaboard. The report that the Tata Iron & Steel Company is to make ferromanganese in India is understood here to mean that the alloy is to be for its own use only and is to have a high phosphorus content. Domestic makers, including the two electrolytic, are not particularly active, though reported to be producing at a fair rate. Some sales are understood to have been made at as high as \$115, seaboard. A report is current that the Shawinigan Electro Products Company of Highlandtown, Md., is to make ferromanganese, in addition to high grade ferrosilicon, announced in THE IRON AGE, May 13, 1915. The marked absence of any great anxiety on the part of consumers is partly explained by the expectation, entertained by them, that domestic production, coupled with various reported methods of conserving supplies, will fill the possible dearth. A cargo of Cuban manganese ore has recently been sold; this is the second large cargo from Cuba in addition to previous sales of small lots. Spiegeleisen is hard to obtain because the principal producer is out of the market for the balance of the year, but sales of another domestic product are reported at \$30, furnace, for the higher grade. Ferrosilicon, 50 per cent, is decidedly active both for domestic and foreign account.

Structural Material.—The last week of September appears to have brought consumers to a realization of the filled up condition of structural mills, and inquiries covering immediate needs and fourth quarter estimates are heavy. The minimum quotation is 1.40c., Pittsburgh, and it is rather widely expected that 1.45c. will be the usual quotation after Oct. 1, as indeed it is not an uncommon one now for the earliest possible delivery. One structural mill, on top of a record for shipments last month, expects to beat that record for September. No notable increase in building activity is noted, in spite of the clearly advancing tendency of steel prices, but the mills will profit somewhat by the increased activity in railroad car buying. Among new structural jobs not heretofore mentioned are a chemical laboratory and a civil engineering building for Johns Hopkins University, Baltimore, 700 tons; a state home for women at Muncy, Pa., 300 tons and marine barracks, Norfolk, Va., 500 tons. Among awards of the week may be mentioned: 1500 tons for the Caxton printing loft to the Harris-Silvers-Baker Company; 1000 tons for the Kirk-

man warehouse, Brooklyn, to the Empire Architectural Iron Company; 400 tons for the Consumers Biscuit Company, Brooklyn, to the A. E. Norton Company, which sublet the fabrication to Milliken Brothers; 500 tons for a power house at Connellsville, Pa., to the Lackawanna Bridge Company; 200 tons for a substation for the Interborough Rapid Transit Company, Long Island City, to the Levering & Garrigues Company; 1000 tons for the Thirtieth Street piershed, Brooklyn, awarded to the American Bridge Company by the Snare & Triest, Inc.; 1000 tons for a sugar plant in Cuba to Milliken Brothers, Inc., which is also to supply 200 tons for a freight shed at Albany, N. Y., for the Hudson Navigation Company, and 750 tons for a court house at White Plains, to William B. Shafer & Co. We quote mill shipments at 1.40c., Pittsburgh, or 1.569c., New York. For small lots from store we quote 2.05c. to 2.10c., New York.

Steel Plates.—The railroad car buying movement, which has been expected for a number of weeks, shows signs of early fulfillment with some substantial sales for the week and well authenticated intimations of new buying, including 10,000 cars for one Eastern line. The strength of the plate market is also indicated by the announcement of one Eastern mill that its price after Sept. 30 will be 1.45c., Pittsburgh, this company incidentally having a greater amount of business on its books than ever before in its history. Inquiry for export is for large amounts and in the case of some round tonnages of boiler plates, 1.65c. f.a.s., New York, is being quoted. The largest new offering of cars is 1000 hopper cars for the Philadelphia & Reading. The New York Central has bought 3500 cars, 2000 gondolas for the Pittsburgh & Lake Erie equally divided between the Standard Steel Car Company and the Pressed Steel Car Company, and 1500 box cars, 1000 to the American Car & Foundry Company and the remainder to the Barney & Smith Car Company. The Chicago & Northwestern has placed 500 ore cars with the American Car & Foundry Company. Delaware & Hudson has bought 6 baggage cars from the Barney & Smith Car Company and some 18 coaches from the American Car & Foundry Company. The Wheeling & Lake Erie, it is expected, will shortly close for about 1000 cars, gondolas and automobile cars; the Western Maryland for 1000 hopper cars, and bids are in for 2000 cars for the Illinois Central, being 500 box and 500 fruit cars for the Central of Georgia, and 1000 refrigerator cars. We quote mill shipments of plates at 1.40c., Pittsburgh, or 1.569c., New York. Plates from store are 2.05c. to 2.10c., New York.

Iron and Steel Bars.—As the end of the third quarter approaches, inquiry has been heavy, and quite a number of fourth quarter contracts for distributors have been closed at 1.40c., Pittsburgh. Some reliable observers report a widening in domestic demand and with the insistent requests for foreign shipment, a rapidly diminishing floating supply of steel is expected, with an upward price tendency hard to keep in check. In some quarters it is expected that 1.50c., Pittsburgh, will be common before the end of the year. Export prices are higher than domestic, 1.55c., New York, being not an uncommon quotation for merchant bars. For the larger size rounds for shells, quotations of 3c. per pound, Pittsburgh, are being made and a sale of a few thousand tons of between 4-in. and 5-in. bars is noted at 3c., cut to shell lengths. It is still possible to get a moderate tonnage of steel bars of these large sizes this year. Bar iron makers also report heavy inquiries and particularly good demand from abroad for track accessories. We quote mill shipments of steel bars at 1.40c., Pittsburgh, or 1.569c., New York, and refined iron bars, 1.519c., New York. Out of store in New York iron and steel bars are 2c. to 2.05c.

Cast-Iron Pipe.—It is now definitely known that Jersey City, N. J., will require 2000 tons of 48-in. pipe, but alternate bids will be received, on a date not yet announced, for flexible joint and bell and spigot. A contract will be let for laying, and the contractor will purchase the pipe. Another contractor's job will be let at Coatesville, Pa., Oct. 7, involving the purchase of

396 tons of 6, 8 and 10 in. The leading interest has been awarded the contract for 350 tons for Colon, Panama. Inquiries from private buyers keep up well and prices are firmly maintained. Carload lots of 6-in., class B and heavier, are quoted at \$24.50 to \$25 per net ton, tidewater, class A and gas pipe taking an extra of \$1 per ton, New York.

Old Material—Transactions have been light in heavy melting steel scrap and rolling-mill stock. Consumers of these commodities seem to be well supplied for the present. Prices, however, appear to be strongly held except on wrought pipe, which has slightly receded. Brokers are paying about as follows to local dealers and producers, per gross ton, New York:

Old girder and T rails for melting	\$12.25 to \$12.50
Heavy melting steel scrap	12.25 to 12.50
Relaying rails	19.50 to 20.00
Rerolling rails	13.00 to 13.50
Iron car axles	22.00 to 22.50
Steel car axles	17.50 to 18.00
No. 1 railroad wrought	14.00 to 14.50
Wrought-iron track scrap	13.00 to 13.50
No. 1 yard wrought, long	12.75 to 13.00
No. 1 yard wrought, short	12.25 to 12.50
Light iron (nominal)	4.00 to 4.25
Cast borings	8.00 to 8.25
Wrought turnings	8.00 to 8.25
Wrought pipe	11.00 to 11.50

Foundries are buying much more liberally, transactions in cast scrap being more numerous. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

Old carwheels	\$12.00 to \$12.25
No. 1 cast (machinery)	12.75 to 13.00
No. 2 cast (heavy)	11.75 to 12.00
Stove plate	9.75 to 10.00
Locomotive grate bars	9.50 to 10.00
Malleable cast (railroad)	10.00 to 10.50

British Market Dull

American Tin-Plate Competition Causes Uneasiness, with Wages to Be Raised

(By Cable)

LONDON, ENGLAND, Sept. 29, 1915.

The pig-iron market remains dull and featureless but better war news encourages sentiment. Hematite iron is firm with fairly good inquiries. Steel is also firm with large government requirements, resulting in conditions which will probably show no change for some time. Rails are inactive. American competition in tin plates causes uneasiness and exports are greatly hindered by restrictions. Tin-plate mill wages will probably be advanced 15 per cent. Furnaces in blast are 163, against 158 a year ago. Stocks of pig iron in Connal's stores were 140,524 tons at the close of last week, as compared with 141,659 tons one week previous. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 17s. 3d.
Cleveland pig-iron warrants, 64s. 1½d., against 64s. 2d. last week.
No. 3 Cleveland pig iron, maker's price, f.o.b. Middlesbrough, 64s. 3d.
Steel black sheets, No. 28, export, f.o.b. Liverpool, £11 15s.
Steel ship plates, Scotch, delivered local yards, £10.
Steel rails, export, f.o.b. works port, £8 17s. 6d.
Hematite pig iron, f.o.b. Tees, 95s. 6d.
Sheet bars (Welsh), delivered at works in Swansea Valley, £7 5s.
Steel joists, 15 in., export, f.o.b. Hull or Grimsby, £11.
Steel bars, export, f.o.b. Clyde, £12 5s.
Ferromanganese, f.o.b., £20 15s.
Ferrosilicon, 50 per cent., c.i.f. £19 10s.

Pig-Iron Exports Growing, Italy and Sweden Taking Large Share

(By Mail)

LONDON, ENGLAND, Sept. 15, 1915.—Hematite iron is steady with a fair general demand; small quantities have been booked for export and prices are high compared with Cleveland foundry iron. The export business in pig iron has been maintained at a good level, the total in August being 73,283 gross tons com-

pared with 28,342 tons for the corresponding month of last year. This big increase, however, is due to the fact that the conditions prevailing in August, 1914, the first full month of the war, were abnormal and a comparison is more justly made with the figures for August, 1913, when our exports of pig iron amounted to 101,843 tons. The total exports for the first eight months of this year, including ferromanganese, ferrosilicon and spiegeleisen, were just a little over half of those for last year, 318,575 tons against 614,339 tons in 1914. Tees shipments during August amounted to 43,098 tons as compared with 55,933 tons in July, a deficit of 12,835 tons. A considerable portion of the exports went to Sweden, 14,911 tons, but Italy with 21,000 tons also figures prominently in the list. The total, however, is the second highest for the year, and is 11,228 tons better than that of August, 1914.

The demand for hematite iron is heavy with a fair general market, but the quantities booked for export are small and prices, of course, are very high as compared with Cleveland foundry iron, but the cost of pig iron, ore and freights has lately been appreciably raised in apprehending a restriction of supply, and consumers have been increasingly inclined to make provision for future needs.

In the finished iron and steel trade war contracts now practically monopolize the output of the majority of plants, and consequently there are few features of general interest. Prices, however, remain at high levels for most products, and deliveries of mercantile orders continue uncertain in view of the pressure of government work. This has been achieved in spite of the tonnage difficulty which is handicapping business.

Metal Market

NEW YORK, Sept. 29, 1915.

The Week's Prices

Cents Per Pound for Early Delivery

Sept.	Lake	Copper, New York		Tin, New York	Lead—New York		Spelter—New York	
		Electrolytic	Refined		St. Louis	St. Louis	St. Louis	St. Louis
22	17.87½	17.75	32.75	4.50	4.32½	13.75	13.50	
23	17.87½	17.75	32.25	4.50	4.35	13.87½	13.62½	
24	17.87½	17.75	32.50	4.50	4.40	14.00	13.75	
25	17.87½	17.75	32.50	4.50	4.40	14.25	14.00	
26	17.87½	17.75	32.50	4.50	4.42½	14.50	14.25	
27	18.00	18.00	33.00	4.50	4.42½	14.50	14.25	
28	18.00	18.00	33.25	4.50	4.42½	14.50	14.25	

Copper is more active. Tin is firmer but dull. Lead is stronger but quiet. Spelter is firm and higher. Antimony is quiet but a little higher.

New York

Copper.—Electrolytic copper is strong with a decided flurry and good domestic business reported to have been done the last of last week and early this. It is believed by some that sellers are anticipating the market too much and in some quarters the advance to 18c., cash, New York, is not regarded as healthy. Producers are asking 18.25c., 30 days, for electrolytic, with some reported seeking 18.50c. Business has been done at 18c., full terms. Good sales for export are announced, especially for France, with a good general buying by other countries. The belief is that domestic buying has not been general. The successful termination of the foreign loan negotiations is expected to add impetus to the market. Prime Lake is firm at 18c., cash, New York, the tendency of its price relation to electrolytic being abnormal. Exports this month total 12,071 tons.

Tin.—The market is very dull with but little transactions reported. No interest is shown in either spot or future metal. The quotation yesterday was 33.25c. Spot is cheaper than futures because of the prevailing uncertainty regarding exchange rates. Heavy arrivals and large stocks on hand adversely affect the market. Sentiment is improved by the successful floating of the foreign loan, which is expected to also help the metal market in general. The London market is steadily advancing, due not to orders from this country but to favorable reports from the Western war theater. The arrivals here amount to 5868 tons, a stock increase Oct. 1 being certain. The quantity afloat is 2810 tons.

Lead.—This metal is stronger than last week with a fair business reported done. While the price has not advanced, one is expected. Independents are not underquoting the leading interest, but rather are closer to its price, some firms not competing at all and some reported as offering the metal at about \$1 per ton advance. The New York quotation is unchanged at 4.50c. but at St. Louis it is 4.42½c. Exports so far this month amount to 1980 tons, having been good the past week.

Spelter.—The market is firm at 14.50c., New York, and 14.25c., St. Louis. Inquiry is plentiful with sellers reluctant. Interest in future delivery is more intense, particularly for November and December, but for prompt both orders and inquiries are fewer. Sales are not of any consequence. Deliveries to the end of the year range in quotation down to 13.25c., New York. The London market is unchanged. Exports so far this month are 3992 tons.

Antimony.—While the market is quiet it has been stiffened somewhat by new inquiry. It is firm at 28c. to 28.25c., duty paid, for Chinese and Japanese grades.

Old Metals.—With more business doing, prices are firm. Dealers' selling quotations are as follows:

	Cents per lb.
Copper, heavy and crucible.....	16.50 to 16.75
Copper, heavy and wire.....	16.00 to 16.25
Copper, light and bottoms.....	14.00 to 14.25
Brass, heavy.....	11.50 to 11.75
Brass, light.....	10.00 to 10.25
Heavy machine composition.....	13.00 to 13.50
No. 1 yellow rod brass turnings.....	13.00 to 13.50
No. 1 red brass or composition turnings.....	11.50 to 12.00
Lead, heavy.....	4.25
Lead, tea.....	4.00
Zinc scrap.....	11.00 to 12.00

Chicago

SEPT. 27.—The market for non-ferrous metals was dull and without special interest through most of the past week. Lead alone showed enough strength to bring a firm advance. Spelter is fractionally higher. We quote: Casting copper, 17.50c.; Lake copper, 18c.; tin, carloads, 33c.; small lots, 35c.; lead, 4.50c. to 4.55c.; spelter, nominally, 14.50c.; sheet zinc, nominally, 16c.; Cookson's antimony 47.50c. to 50c.; other grades, 32c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 14c.; copper bottoms, 12.50c.; copper clips, 13.50c.; red brass, 11.25c.; yellow brass, 10c.; lead pipe, 3.75c.; zinc, 9c.; pewter, No. 1, 18c.; tinfoil, 25c.; block tin pipe, 28c.

St. Louis

SEPT. 27.—Non-ferrous metals have been somewhat stronger. Lead is quoted at 4.45c.; spelter 14c.; tin, 32.75c. to 33.25c.; Lake copper, 18.50c.; electrolytic copper, 17.75c. to 18c.; Asiatic antimony, 34c. In the Joplin ore district the price for zinc blende has been firmer, in sympathy with spelter, the basis range for 60 per cent being \$65 to \$80 per ton, with premium ores reaching \$83 on settlement. Calamine has been quiet at \$50 to \$60 for 40 per cent, top settlement for choicest ores touching \$72.50. Lead ore has been dull at \$50 for 80 per cent. Miscellaneous scrap metals are quoted as follows: Light brass, 6.50c.; heavy yellow brass, 8.50c.; heavy red brass and light copper, 10c.; heavy copper and copper wire, 12c.; zinc, 6.50c.; pewter, 20c.; tin foil, 28c.; lead, 3.50c.; tea lead, 3.50c.

The plant of the Invincible Metal Furniture Company, Manitowoc, Wis., has been closed because of the failure of the Bank of Winslow, Ill., in which J. B. Fuller, president of the company, was heavily interested. Mr. Fuller recently became practically sole owner of the Invincible works. It was originally established as the Invincible Bank Protection Company at Monroe, Wis., and later changed its name to the present title. A year ago the plant and offices were moved to Manitowoc, Wis., where investors gave financial assistance.

The American Rolling Mill Company, Middletown, Ohio, has moved its Cincinnati office from the Mercantile Library Building to suite 1409 Traction Building. Maynard French is Cincinnati manager of sales.

Iron and Industrial Stocks

NEW YORK, Sept. 29, 1915.

The stock market has been fairly boiling the past week, but speculative attention has been almost wholly confined to industrial stocks. Spectacular performances have occurred in Baldwin Locomotive common, Cambria Steel, Lackawanna Steel and Crucible Steel common, while a number of other stocks have made advances which would have been considered sensational if they had not been eclipsed by those just named. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com. 42½-48½	Ry. Steel Spring, com. 39½-45½
Allis-Chal., pref. 70-77½	Ry. Steel Spring, pref. 92-94
Am. Can., com. 60½-65½	Republic, com. 45½-53½
Am. Can., pref. 106-108	Republic, pref. 100½-103½
Am. Car & Fdy., com. 74½-81½	Rumely Co., com. 4½-6
Am. Car & Fdy., pref. 116½-117½	Rumely Co., pref. 6½-8½
Am. Loco., com. 58-71	Sloss, com. 53-58½
Am. Loco., pref. 97½-100½	Pipe, com. 19½-24½
Am. Steel Fdries. 54-60	Pipe, pref. 43-45½
Bald. Loco., com. 82½-150½	U. S. Steel, com. 76½-79½
Bald. Loco., pref. 107½-111	U. S. Steel, pref. 113½-114½
Beth. Steel, com. 353-369	Va. I. C. & Coke. 61-65½
Beth. Steel, pref. 167-183	Westgh's Elec. 118½-126½
Colo. Fuel. 51½-63½	Am. Ship, com. 36½-37½
Gen. Electric. 173-178½	Am. Ship, pref. 73½-74½
Gt. No. Ore Cert. 44½-50½	Chic. Pneu. Tool. 83-89½
Int. Harv. of N. J., com. 106½-109½	Cambria Steel. 65-75
Int. Harv. Corp., com. 68-69½	Lake Sup. Corp. 8-10½
Lackawanna Stl. 68-82½	Pa. Steel, pref. 83½-88½
Nat. En. & Stm., com. 26½-31½	Warwick. 10½-10¾
Nat. En. & Stm., pref. 90	Cruc. Steel, com. 93-103½
P'gh Steel, pref. 92-97½	Cruc. Steel, pref. 106½-112
Pressed Stl., com. 62½-73½	Harb.-Walk, Refrac., com. 60½
Pressed Stl., pref. 101	Harb.-Walk, Refrac., pref. 98½
	La Belle Iron, com. 40½-43½

Dividends

The American LaFrance Fire Engine Company, regular quarterly, 1¼ per cent on the preferred stock, payable Oct. 1.

The American Screw Corporation, regular quarterly, 1½ per cent, payable Sept. 30.

The Canadian Locomotive Company, regular quarterly, 1¼ per cent on the preferred stock, payable Oct. 1.

The Westinghouse Electric & Mfg. Company, quarterly, 1½ per cent on the common stock, payable Oct. 30, and regular quarterly, 1¼ per cent on the preferred stock, payable Oct. 15. The previous dividend on the common was 1 per cent.

The Youngstown Sheet & Tube Company, regular, quarterly, 2 per cent on the common stock and 1¼ per cent on the preferred stock, both payable Oct. 1.

The Western Electric Company, regular quarterly, \$2 per share, payable Sept. 30.

The Pittsburgh Coal Company, regular quarterly, 1¼ per cent, payable Oct. 1.

The Interstate Iron & Steel Company, Chicago, Ill., has entered into a contract with the Chamber of Commerce at Marion, Ohio, to remove to Marion its Cambridge, Ohio, plant, which was recently damaged by fire. The company will be given the building site in addition to a bonus of \$60,000, and practically all the funds for securing the plant have been raised. Plans are under way for a new plant, which, it is stated, will contain one 17-in. roughing mill and two 14-in. finishing mills. It is the intention to make the new plant one of the most up-to-date rerolling mills in the country. It will be used for rerolling steel bars from rails. Some of the equipment that was not damaged in the fire at the Cambridge mill will be removed to the new plant.

The Wellman-Seaver-Morgan Company, Cleveland, Ohio, has received an order from the H. Koppers Company, Pittsburgh, for ten combined coke pushers, levelers and door extractors to be installed in connection with by-product coke ovens recently contracted for by the Koppers company. Three of these machines are for the new ovens of the Youngstown Sheet & Tube Company, Youngstown, Ohio, three for Corrigan, McKinney & Company, Cleveland, two for the Toledo Furnace Company, Toledo, Ohio, and two for the United Furnace Company, Canton, Ohio.

W. E. COREY TO HEAD MIDVALE

Harrah and Other Interests Acquired by a New York Syndicate—Munitions Contracts a Factor

The return of William E. Corey to an active place in the steel trade is the significant fact in the purchase of the Midvale Steel Company by a New York syndicate, of which announcement has just been made. It was stated in these columns last week that negotiations for control of the Midvale Company were in progress and that William A. Read & Co., New York, represented the intending purchasers. The statement is now made that all of the holdings of Charles J. Harrah and other stockholders of the company have been acquired. The original capital of the company was \$750,000, and in February, 1910, it was increased by a 1200 per cent stock dividend to \$9,750,000.

At Philadelphia on Monday, after a meeting attended by representatives of the new owners, William P. Barba, who has been general manager of the company, gave out the following:

"A meeting of the board of directors of the Midvale Steel Company was held, at which the resignation of Charles J. Harrah as president and director of the company was presented and accepted. The resignations of Charles B. Dunn and Howard Sellers as directors were also received and accepted. To fill these vacancies on the board there were elected William E. Corey, Percy A. Rockefeller and Samuel F. Pryor. In order to attend to stock transfer business pending the election of a permanent president, Joseph Entwisle, stenographer to the board, was elected temporarily to this office. The resignation of James F. Sullivan as vice-president was received and accepted, and William P. Barba was elected vice-president of the Midvale Steel Company, Mr. Sullivan remaining on the board as a director."

It is stated also that a meeting for the election of officers will be held in the coming week.

The plant of the Midvale Steel Company at Nicetown, Philadelphia, covers fifty-two acres and consists of crucible and open-hearth steel furnaces for the production of castings, extensive armor plate and forge shops, a projectile department and large machine shops. In addition to castings and armor plate the company has manufactured finished guns of all calibers, ordnance material, marine engines, tool and automobile steel, axles, tires and pressed and steel-tired car wheels. The number of employees of late has been 5500. The company has always done a large amount of work for the Government, but it is stated that the management declined to accept contracts for the European nations now at war. It has been understood that the new owners will engage extensively in the manufacture of munitions for the European belligerents.

The net earnings of the Midvale Steel Company in the fiscal year 1914 were \$416,988. In 1913 they were \$767,931; in 1912 \$670,991; in 1911 \$834,580, and in 1910 \$1,311,181. Charles J. Harrah has been at the head of the company for twenty-eight years. Samuel F. Pryor, who is one of the new directors, is also a director of the Baldwin Locomotive Works and the Remington Arms Company.

In the past week there has been much interest in Philadelphia in the activity in Cambria Steel Company stock, which has advanced under large dealings. Reports were in circulation as to pending deals for merger with other steel companies, but the best information is that there is no foundation for these beyond what has been looked forward to for the past year or more in connection with the options given on the Pennsylvania Railroad's holdings in the Cambria Steel Company and the Pennsylvania Steel Company to the Frick and Donner interests. The purchase of the Midvale

Steel Company appeared to furnish ground for new reports concerning other steel companies, but nothing has developed to indicate that the Midvale deal is complicated with any others.

Pittsburgh and Nearby Districts

An annoying error was made on page 732 of THE IRON AGE of Sept. 23 in the statement that the four bar mills for the Youngstown Sheet & Tube Company, Youngstown, Ohio, are being supplied by the Morgan Engineering Company, Worcester, Mass. These mills are being supplied by the Morgan Construction Company, Worcester.

The Youngstown Sheet & Tube Company has bought 100,000 tons of ore to provide against a possible shortage in supply from its regular sources. The company is operating all of its four blast furnaces in East Youngstown, making about 2200 tons of pig iron per day.

The Gas Brick Company, First National Bank Building, Huntington, W. Va., which recently purchased a large amount of steam power equipment, is in the market for some pressure blowers.

The Pennsylvania Railroad Company is putting over 3000 new steel combination cars of type H21 into the Connellsville coke trade. They are now coming into the region at the rate of 15 per day. They can be used for coal, coke, ore or limestone, are fitted with four hoppers, are self clearing and can be unloaded in a few minutes. They have a capacity of 40 tons of coke or 50 tons of coal. These cars are being supplied, not so much to cover any scarcity of cars which now exists, but to provide for the future.

Reports that the Wellston Steel & Iron Company, Wellston, Ohio, would start up one of its two blast furnaces this month are incorrect. The company says it has not decided on any definite day for starting either of the furnaces.

The Republic Iron & Steel Company is building a large addition to its benzol plant at Youngstown, Ohio, that will about double its capacity. This enlargement will take care of the crude benzol coming from the seventy-five additional Koppers by-product coke ovens that the Republic Company is building, and which will be finished in a short time. Two stills are being added of a larger size than those in the original plant. A bathing pool and shower baths are also being provided for employees of the benzol plant, as the nature of the work is such that frequent bathing on the part of the men is necessary.

The Morgan Welding Company, a new corporation, has acquired a lease of the Andrews foundry in Youngstown, Ohio. It will do all kinds of steel and rolling-mill welding, besides boiler parts, automobile and machinery parts. Guy Morgan is president.

The Wheeling Mold & Foundry Company, Wheeling, W. Va., is operating both its plants to full capacity, and has work ahead for the next three or four months. It is building a large number of one purpose lathes for making shrapnel to be furnished to outside concerns, and is also building a considerable number of lathes to be installed in its own machine shops.

The United Engineering & Foundry Company, Pittsburgh, has received the contract for a 28-in. universal three-high billet and slab mill to be installed in the plant of the Pittsburgh Crucible Steel Company, Midland, Pa.

The General Fireproofing Company, Youngstown, Ohio, is making large shipments of fireproofing to South America and England. It is operating its plant to about full capacity.

The H. Koppers Company, First National Bank Building, Pittsburgh, has taken a contract for building the foundations for the new blast furnace of the United Furnace Company, Canton, Ohio. About 2000 tons of reinforcing steel bars will be used. The Koppers Company took this contract on account of having the foundations to build for the Koppers by-product coke plant and will carry on the work of both jobs at the same time.

THE FOUNDRY MEETINGS

Leading Features of Tuesday's Sessions at Atlantic City, N. J.

The 1915 meetings of the American Foundrymen's Association and the American Institute of Metals opened with a joint session Tuesday of this week at Atlantic City, N. J. The associated exhibit under the direction of the Foundry & Machine Exhibition Company has been under way since Saturday, Sept. 25. In value to those attending both the professional sessions and the exhibit rank with previous annual gatherings, but perhaps that happy fitness of things which has largely contributed to past successes, when these meetings have been held in industrial centers of which the foundry trade is so closely and specially a part, is not so much in evidence.

INDUSTRIAL EDUCATION

In the opening session, Tuesday morning, the problem of industrial education commanded a significant attention. The searching analysis of the situation outlined by Prof. Frank M. Leavitt, of the University of Chicago, in presenting the report of the committee on industrial education added importance to such results as have already been attained. The succeeding discussion enumerated instances of individual advancement by reason of opportunities for instruction associated with industry, and it was pointed out that the tendency toward earlier specialization and toward technical studies for grade school graduates makes imperative a more aggressive treatment of the problem. It was recommended that the movement for more effective industrial education be formulated into a definite program for presentation to the educational authorities.

The papers pertaining to molding sand in both the morning and afternoon sessions provoked a keen discussion, revealing a growing appreciation of the importance of uniform quality, of a better knowledge of bonding characteristics and of reclaiming used sand. The importance of the dye test to determine the colloidal quality of the clay in the sand upon which the strength of the bond is dependent was especially emphasized. To further the investigation of sand characteristics, a committee with Dr. Richard Moldenke, chairman, was appointed to represent the American Foundrymen's Association in conference with the United States Bureau of Standards. It is expected that in this way the elaborate studies already made by Dr. Moldenke may be made the foundation for progressive study.

FIRST INSTITUTE OF METALS SESSION

The first meeting of the American Institute of Metals, Tuesday afternoon, had an unusually large attendance. The review of the past year placed highest value upon the benefits that had been derived from the semi-annual conferences of representatives of the institute with the Bureau of Standards. Investigations otherwise almost impossible have been pursued, and information has been made available through the agency of the bureau to an extent deserving of cordial acknowledgment. Among the technical discussions brought out by the program, that pertaining to the oxidation of gun metal and the occlusion of oxygen had close attention.

Consideration of the effect of impurities in slush castings led to discussions of the impurities in brass and the deleterious effects in weight of cast metal in which cadmium has failed to volatilize.

The exhibit of machinery on Young's Pier is more distinctly a display of strictly foundry equipment this year, the light representation of machine shop equipment being attributable to the great activity of machine tool builders, owing to the war. Improvements in molding machine operation are a feature.

PRESIDENT BULL RE-ELECTED

At the Wednesday evening session President Bull was re-elected, as was Secretary-Treasurer Backert. J. P. Pero, Missouri Malleable Iron Company, East St. Louis, Ill., was elected senior vice-president.

Large Steel Corporation Outlays

A considerable amount of new work has just been authorized or is under way at various plants of United States Steel Corporation subsidiaries. At McKees Rocks, Pa., the capacity of the Carnegie Steel Company's large pressed wheel plant will be doubled when work that has just been started is completed. The cost of the new plant will be \$1,500,000. Various other improvements which the Carnegie Steel Company has under way will cost \$1,000,000. Among these is a 1000-ton mixer at Homestead. Mention was made in last week's IRON AGE of the large extensions to the Ellwood City, Pa., works of the Shelby Steel Tube Company, for which appropriations of \$1,500,000 have been made. The South Chicago works of the Illinois Steel Company will be extensively improved. For new construction and for the rearrangement of various mills at that plant expenditures now planned amount to \$1,000,000.

The Minnesota Steel Company plant at Duluth will probably be making steel by the latter part of October. It is expected that the two blast furnaces will be started within two weeks.

Slag and Waste Rates Attacked

Nine of the leading iron and steel manufacturers in the Youngstown district have united in a petition just filed with the State Utilities Commission at Columbus, Ohio, claiming that the tariffs on slag and refuse from mills in that district are unreasonable and should be revised. The corporations joining in the petition, which was filed supplementary to the petition of the American Steel & Wire Company, are the Republic Iron & Steel Company, Brier Hill Steel Company, Ohio Iron & Steel Company, Andrews & Hitchcock Iron Company, Struthers Furnace Company, Deforest Sheet & Tinplate Company, Girard Iron Company and Trumbull Steel Company. The railroads named are the Erie, Pennsylvania, Baltimore & Ohio, Lake Shore & Michigan Southern, Pittsburgh & Lake Erie, and Lake Erie & Eastern, these being the railroads entering Youngstown.

The move marks the abandonment of the policy adopted by the manufacturers after the Interstate Commerce Commission had permitted the roads to amend their slag and waste tariffs, fixing a rate of 20 cents per ton for hauling such material from the mills. At that time a meeting was held at Pittsburgh and a compromise suggested. The steel companies offered to pay a rate of 10 cents per ton without protest, and it was believed that the railroads would accept that offer. Several months passed without any action in that direction, and the manufacturers finally decided some time ago to place the matter before the State Utilities Commission, which has authority over rates in Ohio, but cannot interfere with tariffs on business crossing the State line.

If the commission acts favorably on the petition, the result will be to lower the tariff on waste at all of the mills in the Youngstown district, as the slag and other waste materials can be consigned to some point within the State and thus covered by the rate established at Columbus. In that event the railroads would undoubtedly be willing to compromise the matter, as they use in Pennsylvania much slag and other material from Youngstown, and would be in an awkward position if the mills were to consign it to some point near at hand and refuse them its use without compensation.

A course of twenty-two evening lectures on heating and ventilation is to be given on Monday evenings at room 511, World Building, New York City, beginning Oct. 4, by Charles A. Fuller of Clark, MacMullen & Riley, consulting engineers, New York City. The fee for the course is \$10.

The Sturn Machinery Company, Wheeling, W. Va., is making plans to build a new foundry. W. W. Krause is general manager.

International Engineering Congress of 1915

Some 250 Papers in 11 General Divisions Read in
Over 50 Sessions at San Francisco Last Week—
Some of the Mechanical and Metallurgical Subjects

The International Engineering Congress of 1915, with its nearly 250 papers and its fifty-four professional sessions confined mostly within four days of last week, is now a matter of history. Held in San Francisco in proximity to the Panama-Pacific International Exposition and opened with an address by Major-General George W. Goethals, chief engineer of the Isthmian Canal Commission and former governor of the Canal Zone, it joined with the Exposition in making this year a celebration of the completion of the Panama Canal. At this writing it would appear that the total active participation will number 1000, including official representatives from Argentine, China, Cuba, France, Germany, Guatemala, Japan, Mexico, Nicaragua, Spain, Sweden and The Netherlands and also from Australia and Canada. The result is a voluminous collection of technical information. Much of this is in the form of comprehensive papers of a more or less historical nature, bringing the stages of development of different branches of engineering up to date, but some of it is of the specific special value for immediate assimilation.

The Congress was organized under the auspices of five national societies, the American Society of Civil Engineers, the American Institute of Mining Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers and the Society of Naval Architects and Marine Engineers. The president and secretary of each society and four members from each society constituted the committee representation of each organization on the general committee of management and of this Dr. William F. Durand, professor of mechanical engineering at Leland Stanford, Jr., University, was chairman and W. A. Cattell, consulting engineer of San Francisco, was secretary-treasurer.

PANAMA CANAL TONNAGE TOLL RATE

In his opening address, General Goethals took occasion to say that the Panama Canal would not measure up to expectations in its public service unless its government should forever be kept free of politics. Although he had failed to impress Congress with the necessity of changing its tonnage charge system, he proposed to keep in the fight for what he considered an equitable adjustment. "I opposed," he added, "the last effort to select a political governor for the Zone with a chief engineer under him. And I hope my successor will be an engineer, and that an engineer will always be in control of the Zone."

Besides the opening ceremonies, which were held on the morning of Monday, Sept. 20, there was an afternoon session on Monday given over to the presentation of a number of papers having to do with the commercial and engineering aspects of the Panama Canal. On Tuesday, Wednesday, Thursday and Friday were simultaneous sections both morning and afternoon, leaving for Saturday morning a general closing session. For example, there were six sessions scheduled on mechanical engineering and three on electrical engineering; separate sessions were held on mining engineering, on materials of engineering and on metallurgy, and there were sessions set apart for subjects which would not fall into any of the general classifications.

FOUNDING IN THE FUTURE

The first paper presented in the mechanical engi-

neering sections was that written by the late Thomas D. West, of Cleveland, on "Recent Advances and Improvements in Founding." The title is quite descriptive of the paper, which is a comprehensive treatment of the subject, copiously illustrated, and covering not only molding machinery but improvements in mixing, screening and conveying sand. Mr. West in conclusion had the following to say: "The growing great scarcity of skilled molders and efficient molder-founder executives is partly, if not largely, responsible for the development and introduction of the molding machine and auxiliaries as found in many foundries to-day. Nevertheless, as there is a limit to the provision of substitutes and makeshifts for skilled artisans and broadly experienced supervisors in founding, I wish it known that many danger signals are out showing that there should be a change toward some radical measure that will insure the production of expert workmen and molder-founder executives. If this way is not opened, the art of founding must soon further pass away. Such a condition is bound to have a most detrimental effect upon the whole casting industry, upon general engineering, and upon the prosperity of the masses; an effect that the employment of the best unskilled labor, or 'handy men,' and of machinery cannot annul."

The paper was discussed by George W. Dickie, the chairman of the session, and by Luther D. Burlingame, industrial superintendent of Brown & Sharpe Mfg. Company, Providence, R. I., the latter of whom seemed to feel that the future outlook for foundrymen is made attractive by the system of apprenticeship in vogue in the East, this system making the youth feel that the trade is worth while and that it holds opportunity for advancement.

FORGING PRESSES IN FAVOR

The second paper, by C. von Philp, manager of the machinery department of the Bethlehem Steel Company, South Bethlehem, Pa., entitled "Forgings from Early Times Until the Present," covered briefly the production of forgings by hammering, pressing and squeezing, extrusion, die-casting and bending. In the absence of the author this paper and the one immediately following were read by Prof. W. R. Eckart, Jr., professor of mechanical engineering at Leland Stanford, Jr., University. This other paper was by A. J. Capron, Sheffield, England, on the "Recent Progress and Present Status of the Art of Forging with Special Reference to the Use of Quick-Acting Forging Presses."

Besides discussing the forging process in a general way, Mr. Capron took up the questions of forging tires, carwheels, axles and shells, the last rather briefly, and in conclusion expressed a belief that forging presses of all powers and particularly of medium and small powers will undoubtedly come into more extensive use in the near future. W. A. Doble, chief engineer of the Pelton Water Wheel Company, San Francisco, told, in the discussion, of some experiences indicating the advantage of forging presses over hammers.

MACHINE SHOP PRACTICES

Two papers on machine shop equipment, methods and processes were presented at the second mechanical engineering session, one by E. R. Norris, director of manufacturing operations of the Westinghouse Electric & Mfg. Company, Pittsburgh, and the other by H. F. L.

Oreutt, managing director of the Gear Grinding Company, Ltd., Hansworth, Birmingham, England. Mr. Norris, among other things, discussed tests of different cutting tools, the heat treatment of tools, the use of stellite, machining with edged tools, milling, drills and drilling machinery, grinding and grinding machines, file sharpening and the electric driving of machine tools.

Carl G. Barth, Philadelphia, in discussing the paper, declared that he had had success in welded high speed steel tips and did not find that they proved more expensive than solid tools. He also took issue with the author with regard to belt feeds, stating that under right conditions they are satisfactory, the trouble being that often they are not large enough for the power required. He mentioned that he had found cast-iron bushings better for countershafts than the bronze bushings. He indorsed the author's advocacy of the use of water when cutting cast iron, as it keeps down the dust and heat and increases the efficiency about 15 per cent. He expressed the hope that some day feeds and speeds for a given piece of work will be the same the world over and deplored the fact that manufacturers do not give correct feeds and speeds in tables in catalogs of their machines.

James Hartness, president of the Jones & Lamson Machine Company, Springfield, Vt., came to the rescue of the manufacturers in saying that the machine builders were trying to give users what they needed and wanted and that inventions are not worked out of mathematics but come afterward in checking up. Mr. Barth was quick to pay a tribute to Mr. Hartness as one of the few tool builders who were striving to help men who, like himself, are aiming for high efficiency in machining operations.

Mr. Oreutt, in his paper, outlined the important improvements of machine tool design, discussed the advances made particularly in grinding machines, in gear cutting and tooth finishing machines and in automatic chucking machines and argued that small concerns, which may not be able to support with profit their own scientific staff, can make use of the numerous central laboratories to collect the best material. The author discussed the limit gage system and also the practice of scientific management in machine shop work.

In the discussion of this paper the use of ball or roller bearings in machine tools was touched on and Mr. Barth explained that ball thrust bearings had been used without trouble in high-speed drills, but Mr. Hartness stated that he had found difficulty in putting ball bearings in spindle bearings, as they seemed to increase the chattering, although this may not have been the fault of the ball bearings.

A paper entitled "Automatics" was presented by Ralph E. Flanders, manager of the Jones & Lamson Machine Company, Springfield, Vt. The paper was illustrated with the modern developments of a large number of well-known machine tool builders and the author discussed automatic action applied to standard machine tools, automatic screw machines and automatic turret lathes. He took up also the tendencies in design and the economics of manufacture with automatic machinery.

Mr. Burlingame paid a tribute to the designers of automatic machines in their achievements in the way of overcoming some difficult problems, such as indexing, separating the chips from the work, revolving the turret as needed, and so on, but he held that there were still problems to be met to make such machinery supplant hand-controlled machines for certain kinds of work. While he agreed with Mr. Norris that belt feeds were satisfactory in some cases, a geared drive is desirable where there is a need of a positive, powerful feed. As among the accomplishments in machine

design he referred to the automatic grinding operations now possible though once thought out of the question.

HIGH TEMPERATURE FLAMES IN METAL WORKING

A paper entitled "High Temperature Flames in Metal Working," by H. R. Swartley, Jr., Jersey City, N. J., was read in abstract. The paper was devoted in part to oxy-acetylene welding and cutting and the use of thermit. Mr. Doble noted that electric processes of welding were not considered in the paper, though he considered the electric method better for pipe line welding than the processes described by the author. He referred to a 42-in. pipe line at Boulder, Col., which leaked at every joint, and while it was repaired by the oxy-acetylene process, it would have been better, he contended, to use electric welding, as electric current was readily available. He mentioned a case of a Y casting which had been in service eighteen months after a crack from shrinkage strains had been welded electrically. In the Pelton works such castings are now deliberately cracked to remove shrinkage strains and after annealing the crack is electrically welded.

SYMPOSIUM ON IRON AND STEEL

A symposium of papers on iron and steel, edited by Dr. Henry M. Howe, was presented at the first metallurgy session, Tuesday, Sept. 21. All of the authors were absent and abstracts were read by the chairman, Prof. J. W. Richards, Lehigh University, or the secretary, Prof. G. H. Clevenger.

The first paper was on "Iron and Steel Castings," by John Howe Hall, metallurgical engineer Taylor-Wharton Iron & Steel Company, High Bridge, N. J. It was discussed by J. W. Beckman, who objected to the expression semi-steel, partly because steel men use it to mislead, and who commented on the X-ray method of disclosing flaws in castings, and by G. C. Carson, who discussed the advantage of adding a small amount of aluminum to the molten metal and commented on the difficulty of making deoxidized steel in an acid open-hearth furnace.

The second paper was "Metallography and the Hardening of Steel," by Prof. Albert Sauveur, Harvard University, Cambridge, Mass. Mr. Carson commenting on this paper expressed his leaning to the Chatelier theory respecting the fluidity of steel. E. L. Foucar, San Francisco, speaking of manganese steel, stated that quenching had the effect of softening it, whereas if it is cooled from a high temperature slowly it will harden.

The next paper, "Case Hardening of Steel," by Prof. F. Giolitti, Turin, Italy, passed without discussion.

"The Duplex Process of Steel Manufacture," by F. F. Lines, Maryland Steel Company, Sparrows Point, Md., the next paper, was discussed by Professor Richards, who gave it as his opinion that before long steel will be commercially produced quite largely by properly combining the use of the Bessemer converter, the open-hearth furnace and the electric furnace, the first to get up the temperature of the metal quickly, the second to maintain it and the electric furnace to finish the process.

"Methods of Preventing Piping in Steel Ingots," the next paper, was written by Emil Gathmann, Baltimore, Md. Prof. A. C. Lawson, University of California, Berkeley, Cal., alluded to the formation of crystal along the walls of the void in some instances and also referred to the practice of rolling mill men in not completely deoxidizing the steel. G. C. Eaton asked the question as to what would be the danger of bleeding the ingot if the piping was cropped off. H. C. Parmelee mentioned cases of segregation of carbon, sulphur and other elements during piping.

"Steel Alloys" was the subject of the next paper, by G. L. Norris, American Vanadium Company, Pittsburgh, Pa. The chairman referred in the discussion

to stellite and its cobalt content. H. J. Kennedy made the statement that the first high-speed steel was produced by the Taylor-White process, to which Professor Clevenger took exception, declaring that high-speed steel was a development from the making of Mushet steel and that proper heat treatment and the using of higher percentages of tungsten was responsible for the development of high-speed steels.

"Steel Making in the Electric Furnace," by James H. Gray, United States Steel Corporation, New York City, was the last paper in the symposium. Of this paper the chairman said that it marks a new epoch in the industry of steel making and that probably in this generation the point will be reached where all steel will be passed through the electric furnace, for it clarifies the impurities left in suspension in an emulsion in the steel made by the open-hearth and Bessemer processes. He was strongly of the opinion that it is likely to become the practice to make steel castings by the use of the electric furnace on the Pacific coast because of the abundance of scrap material and the availability of cheap power so that it can be a commercially successful process. There are now either built or building over forty electric furnaces in America, of which there are twenty-seven of the Heroult type alone. The average size of these furnaces is also greater than the average size in Europe. If the electric furnace be used for the further refining of steel made in present installations of the older processes, as now seems probable, the amount of electric steel produced should then eventually be commensurate with that now being produced by those processes; and it follows that electric steel production in the United States will exceed that of any other country. J. W. Beckman confirmed this with the statement that there are now projected for this section and lower California three or four such installations. Continuing, the chairman mentioned a steel casting plant in Pennsylvania, which, by operating from midnight to 4 a. m., when the power company's load is light, secures its current for 1 cent per kilowatt, and that both the steel company and the power company are profiting by the arrangement.

The last paper was on the subject of "Electro-Metallurgy," by Dr. E. F. Roeber, editor, *Metallurgical and Chemical Engineering*, New York City. The subject was divided into two parts, the electric furnace process and electrolytic processes, and concluded with a combination of the two. In the latter the heating is by the electric furnace but the electrolytic process is also involved. Besides being used in melting and refining, the electric furnace is used for heating bars and billets. The following were given as the three principal applications of the electric furnace: The production of high-grade steels of crucible quality; the electric refining of open-hearth steels for large tonnages, and the making of steel castings in the steel foundry. Another important use of the electric furnace is in the producing of ferroalloys. In Sweden, where power is as cheap as \$8 per horsepower year, pig iron is being commercially produced in electric furnaces. The highest attainment of the electric furnace will have been realized when it is employed directly for making pig steel from iron ore. Already this has been demonstrated as a possibility in Sweden. Commenting on the paper after presenting it, Professor Richards mentioned the effectiveness of the electric furnace in furnishing high temperatures and discussed the possibilities of the electric furnace in localities where current can be secured reasonably enough to compete with coke. J. W. Beckman suggested the possibility of a combined use of electric current with fuel oil or natural gas, both of which latter are available in abundance on the Pacific coast. He also considered that the electric furnace should prove very effective in the handling of refractory ores.

MATERIALS OF ENGINEERING CONSTRUCTION

The third session of the Materials of Engineering Construction section contained two papers of interest to the iron and steel field.

The first was entitled "The Outlook for Iron," and was written by Prof. James Furman Kemp of Columbia University. In the absence of the author the paper was presented in abstract by Prof. C. B. Wing, secretary of the section. This paper passed without discussion.

The other paper was on the subject "Alloy Steels in Bridgework," by Dr. J. A. L. Waddell of Kansas City, Mo. In the absence of the author, E. J. Mehren, editor *Engineering Record*, New York City, presented the paper, reading extracts therefrom, and also an addendum from the author. In the latter mention was made of the use in a bridge across the Ohio River, of silicon steel, having an elastic limit of 45,000 lb. per square inch. One half cent a pound more was paid for the rolled material than had it been carbon steel. He believed that it will be possible to develop an alloy steel which in the form of annealed eye-bars will have an elastic limit of 80,000 lb. per square inch and in plates and shapes an alloy steel with an elastic limit of 70,000 lb. per square inch. Such figures might be reached by the use of vanadium.

National Exposition of Chemical Industries

The first exhibition of chemical industries to be held on any scale in this country took place at the Grand Central Palace, New York, throughout last week, Sept. 20-25. There was a notable display of chemical manufacturing equipment and exhibits of various coal-tar by-products and petroleum derivatives.

Among those who exhibited were the Brown Instrument Company, Philadelphia; the Buffalo Foundry & Machine Company, Buffalo; the Bethlehem Foundry & Machine Company, South Bethlehem, Pa.; the Duriron Castings Company, New York; the Driver-Harris Wire Company, Harrison, N. J.; the Detroit Range & Boiler Company, Detroit; the Lead Lined Iron Pipe, Wakefield, Mass.; the J. L. Mott Iron Works, New York; the Norton Company, Worcester, Mass., and the Valley Iron Works, Appleton, Wis.

The United States Government was represented, showing the Rittmann process for breaking down petroleum into various by-products. The Bureau of Standards displayed a series of pamphlets giving analyses of thirty-four samples of iron and steel standardized for carbon, phosphorus, sulphur, manganese, silicon and special alloying elements. The values are based on the results of analyses made by a selected number of chemists. The pamphlets were certificates accompanying the samples which are used as standards for the analysis of other steels, for determining the values of solutions and for settling disputes between buyers and sellers. Charts were shown of the thermal curves of pure iron, pure Fe-C alloys, and open-hearth and Bessemer rail steels, as well as the typical test pieces by which the curves were obtained.

The Bureau of Standards also showed a sample of "white metal," prepared for analysis by a jet of steam, which reduced it to a mass of small particles. The suitability of this method for preparing alloys in condition for analysis, as standard samples, as compared with filing or sawing, is being investigated by its experts.

The Toledo Shipbuilding Company, Toledo, Ohio, has taken a contract with Atlantic coast interests for two steel vessels of the Welland Canal size and has been given an option on four other boats for the Atlantic coast trade. The vessels will be 260 ft. long and 42 ft. beam. They are to be sailing schooners, but it is the intention to install auxiliary oil burning engines when they reach the coast. This is the first order for boats placed with Lake shipbuilders for a number of weeks.

CONTEST OVER TAYLOR SYSTEM

Labor Plan to Have Congress Prohibit System in Government Shops

WASHINGTON, D. C., Sept. 28, 1915.—Leaders of organized labor are planning to engraft upon the enlarged military and naval appropriation bills which Congress is expected to pass at the coming session carefully drawn prohibitions against the use of the Taylor scientific shop-management system, or any other "efficiency" system, in Government establishments. To combat this movement the Chamber of Commerce of the United States, at the meeting of its general board to be held Oct. 4, will give consideration to the subject. As the purpose of both these movements will be to influence the Congressional committees having charge of these supply bills, the issue will be sharply joined and the outcome will be awaited with interest by manufacturers in many branches of industry.

It is the practice of the committees of the House of Representatives charged with the framing of the budget bills to begin their work a month or six weeks in advance of the convening of Congress. In view of the extraordinary appropriations which it is expected will be carried by the army, navy and fortifications bills at the coming session, it is anticipated that the committees will take up their respective tasks in the latter part of October. The first step in the framing of an annual appropriation bill is to make up a skeleton, including all provisions of existing law which the committee will probably recommend for re-enactment. In view of the action of the last Congress it may be assumed that the prohibitions against efficiency systems, which were incorporated in the army and navy bills, will be placed in the skeletons of the new measures and thus the efficiency opponents will score an important point at the very outset. Later on, of course, the provisions included in the skeletons will be separately voted upon in committee, when they may be either retained or rejected.

Readers of THE IRON AGE will recall that the prohibition in this year's army bill was rendered ineffective because of the fact that the work done under the efficiency and bonus systems at the arsenals was either performed under the provisions of the fortifications bill, which contained no prohibition, or was of such a character that it was practicable to put it on an ordinary piece basis. It is to be expected, therefore, that the labor leaders will this year endeavor to place in the fortifications bill a provision similar to that incorporated in the last army bill, and if this is done efficiency in Government manufacturing plants will receive a severe blow. The keynote of the campaign of organized labor was sounded the past week by Frank Morrison, secretary of the American Federation of Labor, who, in an address before the annual convention of the Maryland and District of Columbia branches of that organization, bitterly attacked the Taylor and other efficiency systems, declaring that they "made machines out of men and brought self-respecting workmen to the level of slaves." He added, significantly, that the Taylor system was "formerly much used" at Government arsenals and navy yards, but had "now been virtually stamped out." It is hardly necessary to say that the machinery of the Federation to be used in following up this campaign is well oiled and will probably be put in operation before the advocates of efficiency systems are thoroughly aroused to the necessity for action.

The Chamber of Commerce of the United States is on record strongly in favor of the Taylor and similar systems of scientific shop management, but up to the present time it has done no practical work to prevent hostile legislation. At the coming meeting of the general board the matter will receive careful attention, and it is understood that a special committee will be appointed and an attempt will be made to arrange a conference with the appropriations committees of the House as soon as they convene in this city to frame the annual budget bills.

The forthcoming annual report of Gen. Crozier, chief of the Ordnance Bureau of the War Department, will be

awaited with special interest, as it is understood he will devote an important chapter to a review of the operation of the Taylor system in the arsenals and a statement of the results accomplished the past year as compared with what may be expected under the legislation enacted by the last Congress, which took effect July 1.

W. L. C.

Prices Strong in the Brass Industry

The fall meeting of the National Association of Brass Manufacturers held at the Hollenden Hotel, Cleveland, Ohio, on Sept. 15 and 16, reaffirmed the association's position in reference to blanket orders, stamping names on goods, taking orders for shipment further than ninety days ahead and the adherence to terms of sixty days net, 2 per cent cash in ten days. It amended its constitution, providing for a first and second vice-president.

A poll of the meeting indicated that business is in a fairly good condition, and while the plants were not operating up to normal in all cases a number reported they were. With the present strong metal market and copper holding at a level of about 18c. with prospects of a good fall business, prices on the finished product would, if anything, be higher than heretofore.

A prominent manufacturer, who is also a jobber, addressed the meeting, stating that generally speaking jobbers would not look with favor upon lowering prices, for under present conditions it would not tend to stimulate or bring out business. "Cut prices only harm the jobber as they reduce the value of his goods on hand and drive their values to a lower level which automatically reduces the total volume of business."

The meeting adjourned to meet in New York, Dec. 8 and 9, which will be the annual meeting.

Thomas Iron Company Annual Meeting

At the annual meeting of the Thomas Iron Company at Hokendauqua, Pa., Sept. 14, the directors were re-elected as follows: Fred R. Drake, Andrew D. Chidsey, Daniel E. Steckel and Ralph H. Sweetser of Easton, Pa.; J. Samuel Krause of Bethlehem, Pa.; Edwin Thomas of Catasauqua, Pa., and J. Mark Mauser of Laury's Station, Pa. Mr. Sweetser was re-elected president and general manager, and Edwin Thomas vice-president. To succeed James W. Weaver, deceased, who had served the company as secretary and treasurer since 1893, Oliver T. Case, who has been in the organization since March, 1910, was appointed secretary, and Lawrence K. Diffenderfer, auditor of the company since January, 1914, was appointed treasurer. For the first time in 61 years a printed annual report of the president and directors and of the treasurer was sent to the stockholders previous to the meeting. The outlook for business was reported encouraging and a demand for more iron ore for the company's furnaces has caused the re-opening of several old local iron mines in Lehigh County.

The movable property of the plant of the defunct United States Metal Products Company, at College Point, Long Island, will be offered by the liquidators at public auction by Charles Shongood, United States auctioneer, beginning Monday, Oct. 4, at 10.30 a. m. on the premises. A fine assortment of high-class machine tools, power presses and equipment will be offered with 2500 tons of raw material in bars, sheet and strip steel, brass, bronze and copper. The buildings have been sold to outside interests and it is essential to dispose of the material at once.

The International Steam Pump Company reorganization plan has been declared operative by the joint reorganization committee. Payment of the assessment of \$12.50 on assenting stock under the plan must be made Oct. 14 or holders of the certificates of deposit may pay 40 per cent on that date and the remainder in three instalments of 20 per cent each on Dec. 14, Feb. 14 and April 14.

Applications of Cores in Modern Molding*

Molding Costs Reduced by the Use of Cores—Discriminating Selection of Binders Profitable—Alternative Binders

BY R. A. BULL†

The word core literally means the central or innermost part of a thing. Naturally enough the term when originally applied to molding was intended to designate the part of the mold which was to form that portion of the casting intended to be hollow, but this word as used in the foundry has come to mean much more than that, and to-day is a misnomer. A core in the accepted, modern, technical sense is any auxiliary part of a mold which is made separately from the main part and which performs the function of helping to shape the casting. As foundrymen we must interpret the word in the way common to the industry. As etymologists we would probably create a more satisfactory term.

A discussion of the part the core has played in the development of the art of molding necessarily must be condensed, since we are chiefly concerned with the functions and manufacture of cores as they have latterly reduced our molding costs, and as they promise further economies.

We may not realize, on casual thought, that the principle embodied in the use of the stop-off core with its almost inexhaustible modifications is the basis for much of the development in the art of molding. The stop-off core could be dispensed with and yet the casting might be molded. The operation is tremendously simplified by its use. Therein lies the interesting feature of the use of cores and the one that has given birth to manifold applications, many of which are of comparatively recent origin.

Given a reasonable number of castings to make from one design, we should bear in mind that in all likelihood the two largest items of expense to us will be the labor of molding and finishing the castings (using the term finishing in its broad sense and not simply as indicative of machining). If a casting is to be floor-molded, unless it is of very plain or peculiarly intricate design, the mold can be made in several ways, one of which may require the use of a three-part flask, another a two-part flask, and another a one-part flask. Green sand molding is generally considered the cheapest means for making the ordinary casting, and yet we may find it to be the most expensive. We must be governed as to the construction of a pattern, not simply by the facility with which the facing may be rammed, but also by the ease with which the pattern may be drawn, by the tendency of all parts of the mold to "stay put" during these and subsequent operations, and by the speed with which these operations may follow each other. In such analysis, it should be kept in mind that the total cost of ramming, baking and handling a few cores is but a fraction of that required to tediously manipulate lifting plates or cheeks, in the majority of cases.

HOW CORES REDUCED MOLDING COST

The writer recalls a casting formed of several horizontal and transverse I-beam members, the total area covered by the flask being considerable. The original method employed in making the mold was by means of a three-part flask, almost the entire mold being made of green sand. It required the skill of five molders and three helpers for two days to make one such mold, and the casting showed the unsightly effects due to the impossibility of keeping the cavities in the mold free from dislodged sand. It became apparent that this method of making the casting was very expensive, and lifting plates, necessitating the use of several hundred pounds of heavy steel rods, were cast and for a time employed, thus eliminating cheeks. This enabled six

molders and four helpers to make a mold in one day. After some time the idea of forming the metal between the top and bottom flanges with dry cores instead of green sand was suggested, and when it materialized, four molders and two helpers were able to make a mold in one day. This method of course necessitated considerably greater cost, and the expense of making one complete set of cores was four times that occasioned by either of the two former methods, but nevertheless it represented only one-half of a day's pay for a molder. The top flanges of these particular castings were comparatively narrow, and the upper surface of the pattern was almost straight. These conditions lent themselves admirably to the use of covering cores, for which suitable binders were designed, superseding the large and unwieldy copes. The application of covering cores enabled one molder and one helper to make a mold in one day, and raised the core cost to 65 per cent of a molder's wages. A simple calculation showed that the total cost of molding and coremaking for these castings was gradually reduced in the proportion of 6 to 1, and that the use of cores in this development reduced this cost in the ratio of about 4 to 1. Other distinct advantages were secured. The appearance of the castings improved to a marked degree. The finishing cost was correspondingly reduced by 30 per cent, and the overweight of the castings dropped from 10 to 4 per cent. Just half the floor space for molding was required after the covering cores and binders had superseded the cope. Gagger expense was eliminated, and was not to any appreciable extent offset by the use of core rods. This is simply a typical example of the way in which cores may be employed to advantage in a manner entirely apart from the function for which they were originally intended.

OPPORTUNITIES FOR EXTENSIVE USE OF CORES

To make many such castings in this way necessitates suitable core room facilities and systematic means for handling cores. In forming comparisons we should bear in mind that the direct labor of making all cores either by day work or by piece work is in most cases probably not more than one-half the total core room expense, and that in many foundries the indirect labor in the core room is a greater percentage of the whole than the indirect labor on the molding floor. Despite all such allowances, if the general design of the castings lends itself reasonably well to any such development as has been above cited, great economies are sure to result by advancing the core room to a more important position in foundry operations. The degree to which coring may be largely employed in molding shops must, of course, be governed by the nature of the castings, and this paper might be elaborated by citing many examples without accomplishing any useful purpose. The subject itself is a tremendously important one, but its limitations for profitably extended treatment in a paper are readily apparent. Each foundry must work out its own salvation as prescribed by the designs of its castings, and the amount of duplicate work. Be it remembered, however, that "copeless wonders," as they are occasionally called by molders, while adapted more readily to patterns having narrow straight top surfaces, may be economical substitutes for the customary cope and drag if angles and radii to some extent break up the plane of the mold's upper surface.

HANDLING AND STORAGE OF CORES

A few desirable considerations that should be given to the manufacture and use of cores which can be profitably carried on in an extensive way, may be appropriately presented for discussion. Any system

*Paper presented at the meeting of the American Foundrymen's Association, Atlantic City, Sept. 28, 1915.

†Commonwealth Steel Company, Granite City, Ill.

which does not primarily provide for the handling of cores in sets will be found unsatisfactory, save in those cases where molds require very few cores, and where these are of standard design. The confusion resulting from ignorance of the number of complete sets of cores on hand is considerable. This factor necessitates liberal facilities for storage and handling. And since it is decidedly advantageous to handle all cores the least possible number of times, much thought should be given to the expedition with which a core may find its way from the oven to the molder. There are plants where operations are so extensive that cores require handling for considerable distances through several channels. The amount of binders in such cases must be considerably greater than that simply required for withstanding pressures exerted in the mold, and should take into consideration the expense of breakage in handling and the importance of maintaining well-defined edges on the cores. Skill in drying is a very important adjunct in maintaining ideal conditions in these respects, and is indicated not only by the time required for baking, but by the character and control of the fuel and by the conditions of the ovens. It can be appropriately remarked in passing that mechanical stokers adapt the use of coal to splendid advantage for core ovens, which give the best results under pyrometer control.

CONSIDERATION OF DRY SAND BINDERS

Any study of sand binders is most interesting and profitable. There is much deception practised upon foundrymen by purveyors of foundry flours and other binders. Large foundries have conveniently at hand means for safeguarding themselves in such purchases which the smaller shops do not enjoy. Nevertheless, the latter can advantageously use a few simple tests to determine certain essentials. By placing a flame similar to that produced by a Bunsen burner under a refractory vessel containing a sample of wheat flour, the absence, after combustion, of any residue save a sort of yellowish film on the vessel will quickly convince any one who has no knowledge of chemistry that there is no plaster of paris or limestone present. An effervescence produced by pouring a small amount of vinegar on a flour sample is evidence that pulverized lime rock or a similar material has been used to defraud the foundryman. Scrutiny of the arts of the conscienceless salesman is necessary, since it can be stated that materials containing 30 per cent of substances which never saw a wheat field, and which were added solely to swell the mass, have been offered to foundrymen as superior foundry flours.

The presence of sea coal in dry-core compound can only be guessed at in the small foundry. Where facilities in the shop are available for making homogeneous sand mixtures, there is no reason for purchasing dry-core compound containing any percentage of sea coal, when it is remembered that this commodity can be bought readily at one-fourth to one-fifth of the cost of a prepared compound, and that it frequently represents 15 per cent of the mass in the latter. The economy of purchasing separately any amount of sea coal found advisable for use in mixtures is obvious, given proper mixing facilities.

Wheat flour is a commodity, the price of which has been greatly increased by the European war. It is now one of the most expensive ingredients we may use in our core sand. Rice flour is a substitute which can be secured under present conditions at a much lower price with the best results. Its bonding strength on the sand fully equals that of wheat flour. The use of either rice or wheat flour can be materially reduced in many cases without any bad effects by using cheaper binders to make the core hold its shape in a green condition.

There seems to be no reason for the use of several kinds of binders except as they are required for the two essential functions of keeping the core stiff enough in its green condition to enable handling to the oven and making it desirably hard after being baked, always providing that undesired properties, such as affinity for moisture and tendency to volatilize, are not present in excessive degree. The strength of pitch which is the basis of nearly all dry compounds comes into

play after baking, and this necessitates the use of another binder as an adjunct. If suitable bonding materials are purchased separately and mixed with the sand thoroughly, pulverized pitch alone can be satisfactorily employed in lieu of dry compounds bearing a trade name. The writer has no quarrel with manufacturers of core compounds, but feels that the cloak of secrecy which is sometimes thrown about these materials can be removed with profit to the foundryman and to the honest dealer in foundry supplies.

DEGREE OF FINENESS OF SAND BINDERS

The degree of fineness to which clay, pitch and other binders are pulverized is very important in predetermining the bonding effect of sand mixtures. Any tendency to coarseness, which may be readily ascertained by the use of a few inexpensive screens, is objectionable. The bonding strength of core sand treated with a pitch compound, of which 75 per cent passed a screen of 200 meshes per square inch, has been found to exceed by 15 per cent or more that attained by mixing with the sand the same volume of an identical compound of which only 35 per cent passed the same screen. The fineness is important from another standpoint. The finer the material the less it weighs per cubic foot, within the ranges common to dry binders. The foundryman buys such commodities by weight, and generally uses them by bulk measure. While he accordingly uses less binders per unit of bulk measure in his sand mixtures as the degree of fineness increases, the strength of his cores is not reduced, but is indeed actually increased by reason of the better distribution in the mass attained by the finely pulverized bonding agents.

LIQUID BINDERS

There are several liquid binders on the market which are treated by-products of paper mills, and which are preferable to molasses as liquid binders. These are supplied with a desired degree of uniformity impossible to secure in the purchase of molasses from different jobbers. Considering that these binders obtained in the manufacture of wood pulp, when mixed with foundry sand, will yield fully one and one-half times the strength of molasses sand, it will be admitted that they have an important function to perform in the core room, especially since they may be purchased at prices which compare favorably with that of molasses.

A simple briquette testing machine is an admirable means for determining relative bonding strengths, and the cost of such a machine could be borne by any foundry. The art of using it can be acquired readily by any amateur. A word of caution might be mentioned as to the necessity for identical treatment of briquettes to be comparatively tested.

USE OF GREEN SAND CORES

Bearing in mind that the cost of cores is considerably increased by the baking process, we may profitably employ green sand cores in many instances. As these comprise a relatively small percentage of all cores made in the average foundry, and as they present few complications or opportunities for novelties in manufacture, it is not thought best to discuss them at length in this paper. Very ingenious arbors have been devised for supporting the sand in green cores, and for its subsequent removal from almost inaccessible parts of castings. Extremely useful applications of green cores have been made to overcome shrinkage difficulties, where the expedients of introducing quickly combustible or easily compressible materials in the interiors of dry cores do not yield the best results. The importance of green cores should not be minimized, but very detailed discussion of them necessarily has more of a local than a general interest.

HANDICAP OF PATTERN DESIGN

A factor which has considerably militated against the more economical use of cores in jobbing shops is the practice that many consumers of castings unfortunately adopt, of providing their own patterns. Users of castings themselves frequently make, or have made, all pattern equipment at the lowest possible cost, ir-

respective of the number of castings required and the application of simplified molding methods. We may admit that this is a condition difficult for us, as foundrymen, to adjust. I, however, believe that we could, with much advantage to ourselves and to consumers, emphasize this factor more vigorously than we have in the past. It is sometimes quite effective to make alternative quotations on castings to be made from patterns furnished by the foundry.

PERSONAL

Earl W. Oglebay of Oglebay, Norton & Co., Cleveland, was designated by a resolution passed by the West Virginia Panama-Pacific Exposition Commission at Wheeling last week as West Virginia's "most useful citizen." Mr. Oglebay's chief public work industrially has been in the advancement of scientific farming, and as a member of the State Board of Regents he has been very active in forwarding educational and social betterment.

H. T. Whigham, representative of the United States Steel Products Company at London, England, is now in the United States.

Foster Milliken, formerly president of Milliken Bros., Inc., and later connected with C. T. Wills, Inc., has been elected president of the McNab & Harlin Mfg. Company. The company's main office is at 55 John Street, New York, and its extensive plant is at Paterson, N. J.

H. B. Zeller, assistant superintendent of the coke plant of the Republic Iron & Steel Company, Youngstown, Ohio, has resigned to become superintendent of the new by-product plant of the Toledo Furnace Company, Toledo, Ohio.

John E. James, formerly in the sales department of the Republic Iron & Steel Company, Youngstown, Ohio, has been transferred to its Philadelphia offices.

Charles Sagert has been made superintendent of the open-hearth steel plant of the Brier Hill Steel Company, Youngstown, Ohio, to succeed Edward Bailey, who has gone with the Algoma Steel Company at Sault Ste. Marie.

S. S. French has been named assistant to L. A. Woodard, vice-president and general manager of the William Tod Company, Youngstown, Ohio. Mr. French has been succeeded as chief clerk by W. A. Hendrick, formerly at the open-hearth steel plant of the Brier Hill Steel Company.

Edward L. Brayton, president Pelton Water Wheel Company, San Francisco, is now in New York City and will probably remain here a week or ten days longer.

T. W. Weaver, formerly director of purchases of the Power & Mining Machinery Company, Cudahy, Wis., has become associated with L. E. Weidinger in charge of the Milwaukee office of A. M. Castle & Co., iron and steel jobbers, Chicago.

George M. Rider has been appointed to take charge of the Kansas City office of A. M. Castle & Co., Chicago. He was formerly engaged in the iron and steel business in Kansas City as a broker.

Willard N. Sawyer, vice-president and general manager, Wellman-Seaver-Morgan Company, Cleveland, Ohio, is suffering from typhoid fever and is in a hospital in that city. He is recovering but will probably be unable to leave the hospital for three or four weeks.

Russel A. Cowles has resigned his position with the American Brass Company and has been elected a director and vice-president of the Buffalo Copper & Brass Rolling Mill, operating a brass and copper rolling plant at Buffalo. Mr. Cowles has also been elected recently president of the Metals Trading Corporation, broker in copper and spelter. He became connected with the Ansonia Brass & Copper Company in 1893

and had been continuously in the service of that company and the American Brass Company, having been a vice-president of the American Brass Company in charge of the Ansonia Brass & Copper branch. His offices will be at 99 John Street, New York, in the New York offices of the Buffalo Copper & Brass Rolling Mill.

William Irwin Ballentine, for several years general superintendent of the Indianapolis plants of the Link-Belt Company, has tendered his resignation.

M. F. Wollering, production manager of the Studebaker Corporation, South Bend, Ind., and Detroit, Mich. has been elected a member of the board of directors. He gained his early experience in Milwaukee shops and joined the Studebaker Corporation when it embarked in the manufacture of motor vehicles.

Charles G. Smith has resigned as manager for the receiver for the Pittsburgh Emery Wheel Company and has identified himself with the Abrasive Materials Company, Philadelphia, Pa., as grinding engineer.

Frederick T. Snyder, president Snyder Electric Furnace Company, 53 West Jackson Boulevard, Chicago, will read a paper before the October meeting of the American Chemical Society in Pittsburgh, describing an electric furnace for carrying out industrial operations at temperatures above 2000 deg. C.

Capt. David C. Hough, who has been representing some American manufacturers at Petrograd, Russia, is in New York, at the offices of the United Engineering & Contracting Company, of which he is president. He plans to return to Russia in a week or two.

Pennsylvania Steel Company Appointments

Several appointments in the sales department of the Pennsylvania Steel Company are announced, in view of the resignation of John C. Jay, Jr., to become chairman of the Maxwell Motor Company, Detroit, and the appointment of R. W. Gillispie to succeed Mr. Jay as general manager of sales.

Robert E. Belknap, district sales manager at Chicago, goes to New York as district sales manager, succeeding Mr. Gillispie. Thomas Blagden, Jr., becomes assistant sales manager at New York. He has been connected with the company since 1904. After a year at the company's mills at Steelton, Pa., he entered the New York office. In 1910 he was transferred to the Boston office, returning to New York in 1912. R. W. Reid, who has been assistant sales manager in the New York district in the past year, has been appointed district sales manager at Steelton, Pa. Mr. Reid, previous to last year, was local sales manager at Philadelphia, and on the amalgamation of that office with the office of the general manager of sales was transferred to New York.

La Belle Works to Issue Bonds

A special meeting of stockholders of the La Belle Iron Works, Steubenville, Ohio, will be held in Wheeling Oct. 27 for the purpose of deciding on a proposed issue of 6 per cent 5 to 25-year bonds to the amount of \$7,500,000. If authorized, the bonds will be dated Dec. 1, and will mature serially from Dec. 1, 1920. The proceeds will be used to pay for the Koppers by-product coke plant of 94 ovens now being built and probably also for a steel bridge across the Ohio River to connect the coke plant with the blast furnaces where the coke will be used. Other large additions and improvements are contemplated by the company, the plans for which have not yet matured.

The Birdsboro Steel Foundry & Machine Company, Birdsboro, Pa., has granted its employees an increase of 4 per cent in wages. This will be virtually a 10 per cent raise, as recently 6 per cent advance was granted as a restoration of the same rate of reduction made when the depression set in. At the blast furnace of the E. & G. Brooke Iron Company a 10 per cent increase has been granted the employees. These increases become effective Oct. 1.

OBITUARY

RALPH BAGGALEY, for many years one of the most prominent business men in Pittsburgh, died at his home in that city Sept. 23. He rendered effective help to George Westinghouse in developing the air brake, and for some years was an officer of the Westinghouse Air Brake Company. He was also president of the Westinghouse Machine Company for a time, and largely increased its output and earnings while serving in that position. He also organized and was president of the Puritan Coke Company in the Connellsville region, which was afterward taken over by the Frick Coke Company and was identified with iron-ore mine operations, at one time owning about 27,000 acres of ore property in the Lake Superior district. Mr. Baggailey had not been active in business for some years, but was interested in a number of enterprises, and within the past few years had patented inventions for the smelting of copper ores and for the recovery of iron in blast-furnace flue dust. He leaves his widow, two sons and four daughters.

WILLIAM L. HURD died at his country residence, Sijourne, near Valencia, Pa., Sept. 26, aged 68 years. He was born at Port Lavaca, Texas, and educated at Brown University, Providence, R. I. For twelve years he was with the National Tube Works Company at McKeesport, Pa. He then connected himself with the Continental Tube Company, and later held a leading position with the Duquesne Tube Works Company. In 1897 he engaged in the iron and steel commission business at Pittsburgh with Hugh H. Davis, as Hurd, Davis & Co., and in 1899 organized and became president of the Monongahela Tube Company, which position he filled at the time of his death. He was also president of the Home Trust Company of Pittsburgh. During the Civil War Mr. Hurd was a member of Company F, Second Massachusetts Artillery. He leaves his widow, one daughter and two sons.

JOHN W. BOOKWALTER, whose name was quite prominent in the steel trade about twenty-five years ago, died Sept. 27 at San Remo, Italy, aged 77 years. While engaged in the manufacture of the Leffel turbine water wheel at Springfield, Ohio, in 1888, he introduced from France the Robert Bessemer process, installing a converter in the plant of the Bookwalter Casting Company, established for the manufacture of steel castings. The converter of this type attained considerable popularity, and it was introduced into quite a number of steel foundries in various parts of the country. For the past 15 years Mr. Bookwalter has spent most of his time in Europe.

HENRY C. SHAW, for many years vice-president of the A. Garrison Foundry Company, Pittsburgh, died at his home in Sewickley, Pa., Sept. 26, aged 61 years. He was born in Pittsburgh and graduated from Rensselaer Polytechnic Institute in 1876, and later entered the employ of the Rensselaer Iron & Steel Company, Troy, N. Y. For a few years he was associated with the Illinois Steel Company, Chicago, and in 1893 returned to Pittsburgh, becoming connected with the Lewis Foundry & Machine Company. Later he went with the A. Garrison Foundry Company and served as its vice-president until his death. He leaves five daughters.

GEORGE O. ALBRIGHT, president Allentown Foundry & Machine Company, Allentown, Pa., died Sept. 17, aged 58 years. He was also head of the firm of Albright, Son & Co., manufacturers of wrought-iron pipe and coils, one of the founders of the Lehigh Telephone Company and a director of the Allentown National Bank. He leaves his widow, three sons and two daughters. One son, Louis, was associated with him in business.

GEORGE E. CORBETT, founder and president of George E. Corbett & Co., Chicago, boilermakers, died Sept. 22, aged 52 years. He had been a resident of that city for 30 years and was among the most prominent of its

manufacturers in that line. He leaves his widow, three sons and a daughter.

GORDON H. WILLIAMS, Cleveland, Ohio, president of the G. H. Williams Company, having a plant in Erie, Pa., and executive offices in Cleveland, was killed Sept. 26 when an automobile which he was driving was struck by a train in Erie. He was 63 years of age and had been engaged for about fifteen years in the manufacture of hoisting machinery.

JOHN E. THOMPSON, pig-iron merchant, 81 John Street, New York, died suddenly Sept. 26 at his summer home in Warren, R. I., his birth place, aged 75 years. His connection with the iron business was begun as a clerk in the old house of John W. Quincy & Co., now out of existence, rising to become a partner.

WILLIAM E. MORROW, Duluth, Minn., auditor for the Oliver Iron Mining Company, died Sept. 15, following a protracted illness, aged 56 years. He had been with the company for the past 15 years.

TRADE CONDITIONS AFTER WAR

National Foreign Trade Council Considers the Tariff Phase

The members of the National Foreign Trade Council held their annual meeting at the Biltmore Hotel, New York, Thursday, Sept. 23. James A. Farrell, chairman of the council, in addressing the meeting laid stress on the need for immediate economic preparation in the United States for conditions which would be met after the war. "European competition," he said, "will be stronger than ever following the war. The alliances have caused the nations on both sides to assume enormously increasing financial burdens. We may well consider whether they will attempt to carry these burdens by means of economic alliances in peace. This suggests possible preferential tariff agreements among nations now allied. Such a change of policy will vitally affect the trade of the United States."

A resolution was adopted urging President Wilson to exercise the authority conferred upon him to negotiate commercial agreements which will assure to American exporters reciprocal and equivalent foreign tariff treatment in return for the valuable market given here to foreign products and to obtain the removal of undue discriminations against the products of the soil and industry of the United States. The resolution also provided that the chairman of the council appoint a tariff committee of seven to include at least five active business men and one tariff expert to report to the council on the efficacy of the present tariff for the promotion of export trade and its protection against discrimination by foreign governments.

The merchant marine committee presented a report setting forth that the general lack of knowledge of the fundamentals of marine transportation rendered difficult the development of a sound policy encouraging the building up of American carrying trade. The committee has had prepared a monograph setting forth in simple language the basic phases of this question and this will be generally distributed. Chairman Farrell announced that a member had established a fund of \$1,500 to be distributed in ten prizes of \$150 each for the best essays on shipping questions by college and university students.

John D. Ryan, president Anaconda Copper Mining Company, presented a report on co-operation in foreign trade, and W. D. Simmons, Simmons Hardware Company, St. Louis, made a report indicating the great difficulty in getting first-class men for oversea trade. Mr. Ryan's report dealt with the public interest displayed in proposals for legislation, or administrative authority, for American industrial enterprises, particularly designed to get the smaller manufacturers to combine more effectively to meet competition in the foreign trade. The views of the council on this matter have been put before the Foreign Trade Commission.

Machinery Markets and News of the Works

DELIVERIES ARE HAMPERED

Machine Tool Shops Must Not Lose Men

Further Inquiry for Large Shells Indefinitely Reported—Numerous Plant Extensions Indicate Greater Production

In all manufacturing centers where metal-working machinery is produced the makers are striving under difficulties to fill the orders on their books. In the West, labor is none too plentiful and agents of the big automobile plants try to lure the men into their shops. In New England deliveries are being delayed by the shortage of labor, the strikes now in force, and the efforts of munitions makers to entice good mechanics away from the machine tool builders and into their shops. Some of the tool makers have been compelled to notify the munitions makers that they cannot expect deliveries to be made on machines unless their agents stay away from the shops where the tools are built.

The war demand has been somewhat quieter in the East, but in the Central West it shows no abatement, especially where the larger sizes of lathes are concerned. Reports are current that inquiries for several million shells are being placed before manufacturers, but they are not confirmed as yet. It is said that 12,000,000 shells 6 in. to 16 in. are wanted by Great Britain and France, while 3,000,000 3-in. shells are wanted by Russia. According to the reports, Canadian interests are seeking to place the orders for England and France.

The Maxim Munitions Company will put the Fuller plant at New Haven, Conn., in operation with 1000 men. The Winchester Repeating Arms Company, New Haven, Conn., has been granted permits for the erection of two large additions to its plant to cost \$300,000. The company now has \$2,000,000 worth of construction under way.

Throughout the country are observed a notable number of plant extensions and business re-adjustments, indicating the taking up of new lines, or increasing output. The Hydraulic Pressed Steel Company, Cleveland, Ohio, will make two extensions to its plant, also adding a boiler house. Akron automobile tire manufacturers have placed orders with one maker of boring mills for 60 machines.

In Cincinnati it is found that the difficulty of securing prompt delivery of tools is delaying expansion. The inquiries for lathes in that city are now for the larger sizes. The Cincinnati Screw Company, a new corporation, has acquired the plants of the Cincinnati Screw & Tap Company and the Victor Stamping Company, and will manufacture screw machine products. The Bickett Machine & Mfg. Company, Cincinnati, will make milling machines. The Cincinnati Milling Machine Company will build an addition to its plant.

The Baltimore & Ohio Terminal Railway is to build a roundhouse and machine shop in Chicago to cost

\$245,000. The Rumely Products Company has plans for an assembling plant at Fargo, N. D., to cost \$100,000. Milwaukee manufacturers look forward to an active winter, and many preparations are being made for increased production. The crane builders of that section report an excellent business, a condition which exists in the East also. In Detroit there are some notable additions to automobile factories.

In St. Louis inquiry for tools is better. The Fulton Iron Works of that city is inquiring for an extensive list of tools. Wood-working and flour mill equipment are in good demand in the Central South.

New York

NEW YORK, September 28, 1915.

With several machine-tool sellers the week has been a little quieter as regards sales, not so much because of a falling off in inquiry as because would-be purchasers hesitate to place orders on which deliveries can only be made some months ahead. Many of the sellers are rather pleased with the breathing spell they have experienced. The industrial demand appears to be irregular, in that some machinery men find it to be good, while others still find most of the activity to be in the nature of war business. All of the orders from the industrial field are small.

The New York Air Brake Company announces that it has received an additional order for shell cases amounting to \$3,675,000, bringing the total on the company's books up to over \$20,000,000.

The American Car & Foundry Company is reported to have added between \$15,000,000 and \$20,000,000 to the amount of its war orders.

The International Steam Pump Company, which found its way into the lathe business through its inability to obtain satisfactory deliveries on machines to fill a war order, is reported to have a sub-contract from the General Electric Company for 750,000 shell cases. The General Vehicle Company, Inc., Long Island City, also has a contract from the General Electric Company and is turning out a large quantity of shell fuses.

Reports are current, though not yet authenticated, that inquiries are being made in this country for 15,000,000 shells. It is said that 12,000,000 are for England and France and are to range in size from 6 in. to 16 in. Russia is said to want 3,000,000 3-in. shells. The reports have it that Canadians are trying to place the orders for Great Britain and France. France heretofore has bought large quantities of material here, but has placed no orders for shells.

Representatives of crane builders say they never knew a time when business was so good with them as it is at present, and the same condition is reported by those handling forging machinery. In many cases business has been lost for the reason alone that specified deliveries could not be made.

The Lucey Mfg. Corporation, Woolworth Building, New York, is asking for bids on 200 armored motor cars, built to the following specifications: Each to have two machine gun turrets revolving independently, placed in such a manner as to allow the maximum fire zone or superimposed; the protection for the driver, gunners and important parts must be unpierceable by sharp bullets, remainder unpierceable at 75 paces; there should be no slits—rivets countersunk; each car must be lined with noise-deadening material; capacity to be five plus driver and 6000 cartridges; the chassis must be first-class, with pneumatic tires, filled with elastic rubberoid masses; engines of 50 hp.; ground clearance, 28 centimetres; speed, 40 to 53 miles, and backward 17 miles per hour.

The Remington Motor Company has purchased the plant at Kingston, N. Y., generally known as the Vaughn Motor Car Company plant. It was formerly the Peckham Car Wheel Company plant and was used for a number of years

for the manufacture of carwheels. The Vaughn Motor Car Company acquired this plant about two years ago and remodeled and rebuilt it with the idea of manufacturing automobiles. The plan was never consummated.

The Norwich Wire Basket Company, Norwich, N. Y., is having plans prepared for a factory, 75 x 200 ft., two stories and basement, of hollow tile construction, which it will erect this fall. T. B. Fernald is vice-president.

The William H. Hurt Iron & Steel Company, Rochester, N. Y., has purchased a site and will erect a factory, 100 x 50 ft., one story, at Scherer and Pomeroy streets.

The Cortland Carriage Goods Company, Cortland, N. Y., has let contract for erection of an addition, 50 x 111 ft., to its plant.

The Vulcan Steam Forging Company, 251 Rano Street, Buffalo, will build an addition to its plant on Rano Street and the Lackawanna Railroad.

The Buffalo Copper & Brass Rolling Mill will erect and equip a new boilerhouse, 42 x 50 ft., at its plant on Military Road and the New York Central Railroad.

The Unique Brass Company, 25 Illinois Street, Buffalo, is having plans prepared for a foundry 50 x 100 ft., one story, and a machine shop, 35 x 85 ft., two stories, which it will erect at Grant Street and the New York Central Railroad.

G. Lever & Co., Gloversville, N. Y., has awarded contract to the William Steele & Sons Co., 1600 Arch Street, Philadelphia, for erection of an addition, 70 x 80 ft., three stories and basement, to be made to its tannery.

The four-story plant of the Chesbro Milling Company, Salamanca, N. Y., was completely destroyed by fire Sept. 25 with a loss of \$80,000. Plans for rebuilding have not yet been formulated. J. D. Gibney is secretary.

Plans are being prepared for an addition to the plant of the Roberston Cataract Electric Company, at South Elmwood Avenue and Mohawk Street, Buffalo.

Plans are being prepared for the construction of a power plant at the mill of J. B. Hurst, Troy, N. Y., to develop 1000 hp.

The Palmer Specialty, Inc., Buffalo, has been incorporated with a capital stock of \$100,000 to manufacture machinery, auto accessories and firearms. Wallace G. Palmer, North Tonawanda, N. Y.; William L. Marcy and S. Fay Carr, Buffalo, are the incorporators. Plans for a factory building have not yet been fully completed.

An addition is to be made to the factory of the Gundlach-Manhattan Company, 765 Clinton Avenue, Rochester.

The Crowther Motor Car Company, Rochester, has let contracts for its factory, 125 x 150 ft., one story, at Ridgeway Avenue and the Buffalo, Rochester & Pittsburgh Railroad. The Seneca Engineering Company, Montour Falls, N. Y., will erect the steel.

The Prather Demountable Wheel Company, Georgetown, N. Y., has been incorporated with a capital stock of \$40,000 to manufacture demountable wheels for automobiles. J. C. Prather, Asa Prather, O. Prather and M. B. Ainsworth are the incorporators.

Nowak & Son, Buffalo, will build a one-story addition to the boilerhouse at their grain and feed mill, at Broadway and the New York Central Railroad Belt Line.

The Phelps Auto Company, Phelps, N. Y., has been incorporated to manufacture automobiles and accessories. John E. McDonough, Earle S. Warner and Elmer G. Miller are the incorporators.

The Cortland Cart & Carriage Company, Sidney, N. Y., increased its capitalization from \$75,000 to \$225,000 to take up the manufacture of automobiles. It expects to continue its carriage business as usual.

The Strieby & Foote Company, 301 Ogden Street, Newark, N. J., manufacturer of drop forgings, is erecting an office building, 42 x 50 ft., two stories.

The Simplex Automobile Company, New Brunswick, N. J., has completed arrangements with the Crane Motor Car Company, whereby it has acquired all the designs, equipment and good-will of the latter company, including the land and buildings comprising its plant at 96 West Seventh Street, Bayonne, N. J. Robert Wasson is factory manager.

The International Arms & Fuse Company, which is erecting a plant for the manufacture of fuses at Bloomfield Avenue and Grove Street, Newark, N. J., has leased a three-story office building at 52 Bank Street, Newark, where it will employ help for its works.

The Heller & Merz Company, 503 Hudson Street, New York City, manufacturer of dye, has awarded contract to the H. D. Best Company, 52 Vanderbilt Avenue, New York, for the construction of a two-story brick factory, 200 x 215 ft., to be added to its plant at Hamburg Place, Newark, N. J., at a cost of about \$15,000.

The Chelsea Fibre Mills Company, 1155 Manhattan Avenue, Brooklyn, N. Y., has secured a permit for the construction of a four-story brick factory to be erected at a cost of about \$30,000.

Philadelphia

PHILADELPHIA, Pa., Sept. 27, 1915.

The Hope Machine Company, 2310 North Second Street, Philadelphia, Pa., is building a two-story addition, 37 x 50 ft., to its factory at 2311 Phillip Street, to take care of its increased business in the manufacture of piston rings.

The Keystone Device Company, Patriot Building, Harrisburg, Pa., recently incorporated, will have its product of nozzles, clamps, etc., manufactured under contract for this year. It will do its own assembling. Isaac W. Matter is president, John M. Delaney is secretary and treasurer and Beverly W. Glover, vice-president and general manager.

The Carpenter Steel Company, Reading, Pa., is erecting a building at its plant, 58 x 130 ft., two stories, at a cost of about \$30,000. It will take care of the carpenter, pattern, pipe-fitters and electrical shops as well as the drafting room. Muhlenberg Brothers, Second National Bank Building, Reading, are the architects.

John Lucas & Co., Inc., paint and varnish maker, 322 Race Street, Philadelphia, Pa., lost one of its dry color plants at Gibbsboro, N. J., by fire Sept. 25. The loss was about \$150,000. Plans are already under way for a temporary building to replace it, pending the construction of a permanent building.

Contract has been awarded to the William Steele & Sons Company, 1600 Arch Street, Philadelphia, Pa., for the construction of a two-story addition to the plant of the Merchant & Evans Company, manufacturer of tin plate, etc., 517 Arch Street, Philadelphia, on the north side of Washington Avenue, near Twenty-first Street. It will be 60 x 230 ft. Sub-bids will be taken in about two weeks.

The Ajax-Grieb Rubber Company, Trenton, N. J., has plans for the erection of a three-story addition to its plant, 200 x 350 ft., provision being made for three stories to be added.

A permit has been granted the Abrasive Materials Company, James and Fraley streets, Bridesburg, Philadelphia, Pa., manufacturer of grinding wheels, for a one-story frame and concrete machine shop and dry room, 44 x 105 ft., to cost about \$2,500.

The William Cramp & Sons Ship & Engine Building Company, Philadelphia, has awarded contract to the Hoffman Engineering & Contracting Company, Pennsylvania Building, Philadelphia, for the construction of a two-story brick and steel building to cost about \$5,000.

The American Coquette Company, Park and Cumberland streets, Philadelphia, has awarded contract to the John Balzley Iron Works, 514 South Delaware Avenue, for the construction of a factory to cost about \$1,250.

The David Lupton's Sons Company, Allegheny and Tulip streets, Philadelphia, Pa., manufacturer of steel sash, etc., will erect a two-story brick addition to its office, 34 x 146 ft., to cost about \$12,000.

The Ross-Tacony Crucible Company, Tacony, Philadelphia, Pa., has awarded contract to George Gray, 4665 Paul Street, for the construction of a three-story brick addition, 35 x 72 ft., to cost about \$7,900. This addition is to provide space for its increased business.

Baltimore

BALTIMORE, Md., Sept. 28, 1915.

A number of the smaller machine shops of Baltimore are considering the advisability of pooling for the purpose of securing some large munition contracts.

The Ameri-Can Sealing Machine Company, manufacturer of a patent can sealing machine, has leased a warehouse at 1603-1609 North Washington Street, Baltimore, and will install lathes and other machinery for the manufacture of the machines.

The Star Crescent Specialty Company of Baltimore City, Inc., has been organized with \$20,000 capital stock to manufacture and deal in machine and electric novelties. The incorporators are Charles W. and Philip H. Lydecker and Henry F. Hohnberger.

Additional equipment for the manufacture of ice will be installed by the Farmville Ice & Cold Storage Company, Farmville, Va., of which W. C. Newnan is manager.

Robert S. Gilman, Richmond, Va., is understood to be planning the construction of a factory for the manufacture of a patent door and window closing device.

The E. I. DuPont de Nemours Powder Company, Wilmington, Del., has purchased the plant of the J. Morton Poole Company, machine builder, foot of Thorn Street. The DuPont Company has operated the plant under lease for some time. T. K. Burns will be superintendent and G. F. Daniels will have charge of the machine shops. Homer J. Forsyth is general manager.

With a capital stock of \$100,000, the Motor Cooling Systems Company, Baltimore, has been incorporated by J. Glenn Cook, Jr., Richard W. Cook and W. Howard Hamilton.

A plant to distill alcohol from molasses probably will be built at Chester, Pa., by the Stewart Distilling Company, Philadelphia, which has bought 14 acres of land on the Delaware River, at a cost of about \$500,000.

New England

BOSTON, MASS., Sept. 27, 1915.

Machine-tool builders report that large orders are not so frequent, but that the volume of sales is keeping up, due to the many smaller orders coming from widely-scattered sources. Those working on unexpired contracts who are having labor troubles are mostly protected by clauses inserted in the contracts covering this contingency, and are notifying their customers that deliveries will be delayed by the existing conditions.

Notwithstanding the labor situation, the manufacturers in metal lines are, as a whole, most optimistic, as the majority look for no long-continued struggles in any of the cities involved and believe that the present feverish conditions among industrial workers will be followed by a long period of peaceful convalescence when matters of working hours and wages will adjust themselves equitably. The most disquiet is caused by the consistent and often successful attempts of munitions manufacturers to entice away the good workmen in the plants engaged in supplying the munitions plants with the machinery necessary for the conduct of their business. It is reported that some of these manufacturers have notified the munitions plants that if they expect to get deliveries on their contracts for machines they must keep their agents away from the employees of the machine builders.

Among those who have been busily engaged on direct or indirect war orders a noticeable increase of interest is apparent in the development of new products and the extension of trade into new markets in anticipation of times of peace. The glamor of war business is fading away and profits have not always been as large as anticipated, so manufacturers are beginning to take active steps to place their businesses in a more healthful condition and are quietly preparing for the period of readjustment which all can foresee is coming.

There have been persistent rumors of offers as high as \$1 an hour for machinists but they seem to have no foundation in fact. One or two instances are known where toolmakers on special work have been offered as high as 90 cents an hour. The rumors may, perhaps, have their foundation in the fact that in a few plants where skilled men have been working long hours overtime on a premium basis, their wages have been between \$50 and \$80 a week. One of the facts brought to light by the labor troubles is that most of the skilled machinists have individually received substantial increases in pay during the past year.

The Howe Scale Company, Rutland, Vt., has purchased the business of the Springfield Scale Company, Springfield, Ohio, from the Winters-Coleman Company, manufacturer of automatic grain scales. The machinery and patents have been acquired and the equipment is being removed to a new building at the Howe plant.

The Harris-Corliss Engine & Machine Company is a new Providence, R. I., corporation with authorized capital of \$400,000. The incorporators are Volney M. Wilson, Jr., Barrington; Richard S. Aldrich, Warwick; Frank Gibson and Frank L. Hinckley, Providence.

The contract for the factory to be occupied by the Hartford Automobile Parts Company in New Britain, Conn., has been awarded to the B. H. Hibbard Company, New Britain. The contractor has sixty-five days in which to erect a two-story building, 60 x 210 ft.

The Chase Metal Company, Waterbury, Conn., has secured the following building permits: 140 x 180 ft., one story; three additions, 60 x 260 ft., 60 x 320 ft. and 20 x 60 ft., two stories; two additions, 60 x 160 and 60 x 200 ft., two stories; two additions, 60 x 80 and 60 x 120 ft., two stories; and foundation for addition 100 x 200 ft., all of brick and steel.

The Thompson Drop Forge Company, Plantsville, Conn., has completed the purchase of the former Peck, Stowe &

Wilcox plant in Plantsville. In its new quarters the capacity of the Thompson Drop Forge Company will be trebled.

It is reported that the Maxim Munitions Company will begin operations in about a month in the Fuller plant, which it recently acquired, in New Haven, Conn. It is expected that about 1000 hands will be employed.

The Bridgeport Crucible Company, Bridgeport, Conn., has let a contract for a one-story addition, 28 x 30 ft.

The rumor that the Remington Arms & Ammunition Company would not engage in building homes for its employees seems to be effectually contradicted by the announcement that it has secured building permits for the erection of 24 two-apartment brick houses.

The Atwater Mfg. Company, Plantsville, Conn., is adding to its facilities in its drop forging department. The company is very busy and is taking on extra employees.

The Beaton & Cadwell Mfg. Company, New Britain, Conn., is increasing its capital from \$50,000 to \$100,000. It has bought the Lyman H. Snyder Company, Bristol, Conn., manufacturer of ceiling and floor plates, and is removing the equipment of the Snyder plant to New Britain.

The American Brass Company has awarded a contract for a factory on West Main Street, Waterbury, Conn. It will be of brick and steel, 76 x 228 ft., one story.

Newspaper dispatches that the Splittdorf Electrical Company, Newark, N. J., one of the subsidiaries of the Torrington Company, Torrington, Conn., has purchased the Sumter Electrical Company, Sumter, S. C., cover the formal transfer of the Sumter Company, which has been a member of the Torrington "family" for about three years.

The Winchester Repeating Arms Company, New Haven, Conn., has secured permits for the erection of two more buildings. One, 60 x 152 ft., six stories, will be located on Munson Street with wings on Winchester Avenue and the railroad and will be used as a factory and storehouse. The other, a five-story building costing \$300,000, will be located on Mansfield Street and will be used for factory purposes. These additions to the Winchester plant bring the amount of construction work under way for this company in New Haven close to \$2,000,000.

The Boston Woven Hose & Rubber Company has awarded a contract for a storehouse and manufacturing building, 60 x 153 ft., four stories.

Detroit

DETROIT, MICH., Sept. 27, 1915.

Nelson Brothers, manufacturers of gasoline engines and pumping machinery, are building a large addition to their plant at Saginaw, Mich.

The W. E. Dunn Company, Chicago, manufacturer of concrete machinery and oil engines, will locate a plant at Holland, Mich.

The Rock-Way Starter Company will establish a plant at Jonesville, Mich., and expects to install the necessary machinery at once. George L. Rock is manager.

The United Motortruck Company, Grand Rapids, Mich., will build a one-story addition to its factory.

The Wilmarth-Morman Company, Grand Rapids, Mich., will build a one-story brick factory to cost \$8,000.

The McCord Mfg. Company has purchased factory property in Wyandotte, Mich., which will be occupied by the gasket department of its business.

The new factory building of the Bradley & Ankerbrand Company at Muskegon, Mich., has been completed and machinery is now being installed. The company's standard line will be cast-iron plumbing and steam goods, but it will also make special castings on order.

Bids have been taken by Smith, Hinchman & Grylls, 710 Washington Arcade, Detroit, Mich., for the construction of a die shop, 50 x 400 ft., four stories, of reinforced concrete construction and for a pressed steel shop addition, 223 x 400 ft., four stories, of reinforced concrete construction, both for Dodge Brothers, automobile manufacturers, Hamtramck, Mich.

The Timken Detroit Axle Company, Detroit, Mich., is adding a one-story steel and reinforced concrete drop forge plant, 70 x 400 ft., to cost about \$260,000. It will be equipped with boilers of 1200 hp. capacity, magnetic overhead cranes. Thirty-five drop forging machines are specified.

The address of the Lloyd Mfg. Company, mentioned in THE IRON AGE, Sept. 16, as Menominee, Wis., should have been given as Menominee, Mich.

Chicago

CHICAGO, ILL., Sept. 27, 1915.

Inquiry for machine tools is steadily augmented. In addition to the seemingly insatiable demand created by the war, local shops are coming into the market for equipment of all descriptions for plant extensions. A considerable proportion of the wants of buyers cannot be met, although orders for tools are being placed, the delivery of which is scheduled for next May. It is perhaps fortunate that railroad buying is on a conservative scale. The Santa Fe apparently has completed its purchases without buying all of the tools for which its inquiry called. The Illinois Central and Burlington railroads are still in the market but their lists are not large. Shop extensions for the Baltimore & Ohio Terminal road at Chicago and the International & Great Northern are expected to lead to purchases of some machine tool equipment.

The additions to the plant of the Belle City Malleable Iron Company, Racine, Wis., will include, we are advised, the erection of a new building, 80 x 320 ft., and the installation of a 3-ton Heroult electric furnace. The plant and equipment is expected to cost approximately \$100,000.

The Burlington Separator Company, 307-311 Third Street, Burlington, Iowa, is in the market for electric motors, gas, gasoline and oil engines and dynamos. This power equipment is to be used for driving the separators which the company builds. In addition, tool and machinery equipment will be required.

The Continental Bolt & Iron Works, Chicago, will build an addition to its plant to cost \$6,000.

The Baltimore & Ohio Terminal Railway Company will build a two-story roundhouse and machine shop on West Fourteenth Street, Chicago, which will cost \$245,000. M. A. Long is the architect.

The Francis & Nygren Foundry Company, Chicago, is to build a two-story addition to its plant.

R. G. Pierce, 10 South LaSalle Street, Chicago, is taking bids for a one-story factory, 99 x 110 ft., for the Delta Star Electric Company, 617 West Jackson Boulevard.

Increasing business at the Chicago store of the Pratt & Whitney Company has caused it to move its stock of machine tools, machinists' small tools and gages to larger quarters in the new Sharples Building, at Washington Boulevard and Jefferson Street.

The H. Mueller Mfg. Company, Decatur, Ill., has begun the construction of a one-story factory, 66 x 152 ft.

The Rumely Products Company will build a large assembling plant at Fargo, N. D., which will cost about \$100,000.

Armour & Co., Chicago, will make improvements to its plant at the Denver Union Stock Yards at a cost of about \$300,000.

The Plattner-Yale Mfg. Company, Lincoln, Neb., will erect a foundry, machine shop and several small buildings, to cost \$50,000.

The National Steel Post Company, Cedar Rapids, Iowa, will locate in East Moline, Ill. It will be reincorporated and will be known as the National Steel Product Company of East Moline.

The Commonwealth Light & Power Company, Iowa Falls, Iowa, has been incorporated with a capital of \$250,000 by Arnold R. Baar, Jacob Schwartz and Leo O. Levy. It will build and own power houses and transmission lines.

G. T. Hatten, mayor, Sidney, Iowa, will receive bids until Oct. 5 for waterworks improvements, including a triplex power pump with a capacity of 200 gal. per minute and a 35-hp. internal combustion engine.

The Brown Sheet Iron & Steel Company, 129 Fifth Avenue, South, Minneapolis, Minn., manufacturer of welded and rolled barrels, tanks, etc., has purchased a block in the Midway district, bounded by Berry Avenue, Pearl Street, Curfew Avenue and the Northern Pacific Railroad tracks, on which it will erect a two-story brick and steel factory, 75 x 150 ft. The upper floor will be used as a warehouse. George A. Brown is president.

The Penhallegon Radiator Company, Owatonna, Minn., is to be incorporated very shortly with a capital stock of \$150,000, and will make detachable automobile radiators. William F. St. Clair is president.

The Slayton Power Company, Slayton, Minn., will build an addition to its plant and will install a 100-hp. oil, steam or producer gas unit and an electric generator and switchboard. F. H. Eddy is manager.

The Superior Mfg. Company, Preston, Iowa, has been incorporated with a capital stock of \$10,000 to manufacture scrapers and road machinery. M. F. Black is president; George Beckwith, vice-president; Harry Rex, secretary, and Harry Trup, treasurer.

Cleveland

CLEVELAND, OHIO, Sept. 27, 1915.

The demand for machinery for making war material and for other purposes continues heavy, and new inquiries are appearing for 18-in. to 24-in. lathes in lots up to 60 machines. While orders for turret lathes are not coming out as fast as a few weeks ago, many inquiries are in the market, including one from a Cleveland manufacturer for 80 machines. A representative of an automobile company in Spain that uses American machines for the most part is in this country buying machine tools, and while in Cleveland last week placed an order for a good lot of machinery, including turret lathes and automatics. The importance of automobile tire manufacturers as a buyer of machinery is indicated by the fact that one of the builders of boring mills has booked orders this year for close to 60 boring mills for Akron tire manufacturers and machine shops, for making tire molds. During the week one order for five boring mills came from this source and other orders for single machines. The demand for forging machinery is heavy and a local maker is crowded with orders that require plant operations day and night. High prices have brought out a great deal of second-hand machinery the past few months, but this appears to be well cleaned up in the Cleveland territory as reports indicate that dealers are having difficulty picking up desirable second-hand machines. The demand for locomotive cranes, coke-making machinery, standard cranes and other handling and special machinery has improved.

The Standard Oil Company has placed a contract with the Samuel Austin & Son Company, Cleveland, for a manufacturing and shipping building in Cleveland of brick and steel, 70 x 440 ft.

The Hydraulic Pressed Steel Company, Cleveland, will make further extensions to its plant in addition to those recently announced. One building, 80 x 360 ft., is now approaching completion to which two extensions will be made, one 80 x 200 ft. and the other 40 x 280 ft. A pump and boiler house 60 x 140 ft. will also be erected and two 250-hp. boilers installed.

The Dyer Company, Cleveland, has taken the contract for the erection of a sugar-making plant at West Jordan, Utah, with a capacity of 600 bbl. a day, and another contract for the removal and enlargement of a plant to be located at Spanish Fork, Idaho, which will have a daily capacity of 1000 bbl. Considerable equipment will be required.

The Youngstown Sheet & Tube Company has an inquiry out for machine tools, including a 14-in. and 24-in. lathe, one 48-in. planing machine, one 42-in. boring mill and shears and a pneumatic hammer.

The Eagle-Macomber Motor Car Company, Sandusky, Ohio, has been organized to manufacture low priced automobiles equipped with rotary air-cooled motors. It is using part of the plant of the Suspension Roller Bearing Company for assembling purposes. U. B. Curtis is general manager. The motors will be built by the Dauch Mfg. Company.

The Presteel Company, Lorain, Ohio, has been incorporated with a capital stock of \$25,000 by M. M. Koch, C. S. Ferguson and others to manufacture pressed steel novelties. It has taken over another plant on Thirty-fourth Street, Lorain, but it is stated that it will probably move to Cleveland.

The New Philadelphia Paving Block Company, New Philadelphia, Ohio, recently incorporated with a capital stock of \$150,000, will establish a paving block plant with a daily capacity of 50,000 blocks. J. DeWitt and others are interested.

The Sebring Tire & Rubber Company, Sebring, Ohio, has been incorporated by John S. Hotchkiss, William S. Smith, C. D. Smith, H. D. Weaver and S. W. Stevenson to establish a plant for the manufacture of automobile tires. It is stated that construction work will be started shortly.

The Perfection Bed Spring Co., Mansfield, Ohio, is erecting a new plant, which will be two stories, 50 x 100 ft.

The Timken Roller Bearing Company, Canton, Ohio, is building a large addition to its grinding room.

Indianapolis

INDIANAPOLIS, IND., Sept. 27, 1915.

The Hayes Wheel Company, Jackson, Mich., has made arrangements for locating a new factory at Anderson, Ind.

The Wayne Oil Tank & Pump Works, Fort Wayne, Ind., is to start work at once on two factory buildings, which will cost about \$40,000. A large amount of new machinery is to be purchased.

The Apperson Brothers Automobile Company, Kokomo, Ind., has started work on an addition to its plant.

The Holland Machine Company, South Bend, Ind., has been incorporated with a capital stock of \$125,000 by W. H. Holland, C. Workinger and George Snyder. It will manufacture special machinery.

Milwaukee

MILWAUKEE, WIS., Sept. 27, 1915.

Improvement in the general metal-working trades is bringing a demand for prime movers. While contracts closed are small, purchases are sufficient to create good feeling, inasmuch as there has been no fine of trade so dull as this. Machine-tool-builders are obliged to defer new contracts, being sold up for a long time ahead. Plant extensions continue, but notice of requirements for general equipment is given well in advance and little difficulty is experienced in meeting them. The demand for second-hand machinery is brisk, but the market is well cleared and dealers could dispose of more than they have available. Milwaukee crane builders have been experiencing excellent business, and almost everywhere preparations are being made for an active winter.

The Milwaukee Die Casting Company, 108 Manufacturers Home Building, Milwaukee, will build a foundry, 50 x 60 ft., in addition to another building of similar size, previously mentioned.

The Simple Gas Engine Company, Ashland, Wis., will erect additions and a foundry building. A. L. Priemburger is president.

Fred Glines, Omro, Wis., has leased the Leighton Building for a garage and repair shop and is now remodeling it and buying equipment.

The plant of the General Electric Company at Madison, Wis., has been consolidated with the Fort Wayne Electric Works, Fort Wayne, Ind., and the stock and special electrical machinery is now being moved to Fort Wayne. The Madison plant has been taken over by the Gisholt Machine Company, Madison, which is building extensive additions. The electric and Gisholt works adjoin each other. As departments are vacated, the Gisholt company is taking possession. Much of the equipment will be left in the plant.

John Luke and A. H. Voltz, Burlington, Wis., have leased the Forge Building and are remodeling it into a garage and machine shop. An addition will be erected to accommodate the commercial machine work.

The Belle City Iron & Metal Company, Racine, Wis., has been incorporated with a capital stock of \$5,000 by Oscar Weismann, Rebecca Weismann and Louis Kofmann.

The Pennsylvania Coal & Supply Company, Caswell Block, Milwaukee, has been reorganized and the capital stock increased from \$890,000 to \$1,500,000. The company will spend about \$150,000 in enlarging its coal docks and making additions to the unloading equipment. J. B. Whitnall is succeeded by F. S. Peabody of Chicago as president, but retains his interest.

E. E. Senberth, Kilbourn, Wis., has awarded contracts for the erection of a garage and machine shop to cost \$5,500. It will be of concrete, one story, 55 x 120 ft.

The Sheboygan Novelty Company, Sheboygan, Wis., will erect an addition to its plant, four stories, 95 x 120 x 32 ft. It manufactures metal, wood and leather novelties. Equipment is now being purchased.

P. O. Vivian, Mineral Point, Wis., will erect a garage and machine shop to cost \$9,000. It will be of brick, tile and steel, one story and basement, 56 x 120 ft.

Clintonville, Wis., is in the market for a small list of power and electrical equipment for its water and light plant, including a Corliss engine and 80-kw., 2300-volt, alternating current generator.

James E. Dempsey, Manitowoc, Wis., is making plans for the manufacture and marketing of devices for automobile control.

The Gardner Machine Company, Beloit, Wis., manufacturer of disk grinding machines for metal work, is adding about 5000 sq. ft. to its floor space. The addition will be ready for operation in 60 days. L. Waldo Thompson is president.

The Milwaukee Separator Company, 265 Sixth Street, Milwaukee, recently declared bankrupt, has been purchased by Percy C. Eldredge, general superintendent of the Chicago, Milwaukee & St. Paul Railway Company at Milwaukee, who intends to resume operations as soon as a proper location is determined upon. The sale price was \$21,100. The company has contracts but was unable to proceed because of the lack of working capital.

Harris Brothers Company, Chicago, Ill., has purchased the properties of the defunct Prime Steel Company, Milwaukee, and intends to make arrangements for a speedy resump-

tion of operations. The sale price was \$30,000 for equities, stock, machinery and equipment in the two plants, known as the Dutcher and the Crucible works.

The Roberson Electrical Appliance Company has been incorporated at Milwaukee by L. C. Roberson, P. A. Klumb and D. C. Madden, with a capital stock of \$10,000.

The Nelson-Indra Machinery Company, Green Bay, Wis., has been awarded the contract for a 350-hp. Corliss engine for the enlarged power plant of the Scheider-Brown Lumber Company's mill at Marquette, Mich.

The Reliance Garage, 6520 Greenfield Avenue, West Allis, Wis., is building an addition to its machine shop.

Cincinnati

CINCINNATI, OHIO, Sept. 27, 1915.

A number of local manufacturers are expanding their equipment, and several contemplate additional buildings. Prompt delivery of machine tools is difficult to secure, however, which will tend to delay getting the new departments in full operation. Local lathe builders are somewhat different about taking further business at present. Many of them expect a better domestic demand later and do not wish to fill up their shops with foreign emergency orders that might interfere with their home business. Foreign inquiries and orders for lathes are almost exclusively for the larger sizes. Formerly, a 12 or 14-in. lathe was considered by many manufacturers of war munitions large enough for turning shrapnel and other small shells, but specifications now call for machines with a swing ranging from 20 to 36 in. A well-informed machine-tool builder states that practically all of the lighter lathes shipped to Europe at the beginning of the war are now in the scrap pile. Makers of sugar machinery are still busy on orders received from Cuba, and a few of the smaller sized mills have been ordered by Central and South American customers. The local foundries are busy, the exception being the stove makers. Gas engine manufacturers report a fair business.

The Cincinnati Screw Company, Cincinnati, has been incorporated with \$100,000 capital stock by B. B. Quillen, C. H. M. Atkins, H. C. Otterbein, and others, and has acquired the plants of the Cincinnati Screw & Tap Company and the Victor Stamping Company, located in Loveland, a Cincinnati suburb. The two buildings are approximately 80 x 260 ft., two stories, and are equipped with power plants and machinery. It expects to manufacture screw machine products.

The Bickett Machine & Mfg. Company, Cincinnati, has arranged to manufacture hand bench milling machines. No new equipment is needed.

The Elmwood Castings Company, Elmwood Place, Cincinnati, will make an addition to its plant, 60 x 80 ft., one story, factory construction, to be used for molding purposes.

It is reported that the Cincinnati Milling Machine Company, Oakley-Cincinnati, will build an addition to its plant, 60 x 220 ft., one story, of sawtooth roof construction.

The Modern Foundry Company, Oakley-Cincinnati, will enlarge its plant at an early date. Full details are not yet available.

The Joseph Joseph & Brothers Company, Cincinnati, old material merchant, will make a two-story addition to its office building.

It is rumored that the Love Machinery Company, Lexington, Ky., is negotiating with Cincinnati lathe builders for a sub-contract to manufacture lathes.

The Ideal Light Car Company, Columbus, Ohio, has been incorporated with \$100,000 capital stock by G. C. Howard and others. No manufacturing plans are available.

The Dayton Pneumatic Tool Company, Dayton, Ohio, will make an addition to its plant, 50 x 170 ft., two stories, of brick construction.

Charles A. Craig, Dayton, Ohio, is reported as heading a company, now being formed, to take over the plants of the Ohio Sterling Company and the Ohio Foundry Company, East End. No manufacturing plans have as yet been given out.

The Webster & Perks Tool Company, Springfield, Ohio, has increased its capital stock from \$25,000 to \$150,000. The company recently removed its plant to the Shuey Power Building.

The Ironton Engine Company, Ironton, Ohio, will engage in the manufacture of mine locomotives.

The People's Power & Light Company, Botkins, Ohio, has been incorporated with \$15,000 capital stock by J. W. Shuey and others.

The Central South

LOUISVILLE, KY., Sept. 27, 1915.

Machinery companies state this month to have been one of the best for a long while, and reports the past week have all been favorable. The demand for heating plant equipment has been heavier than usual, while tank and other sheet metal work is also plentiful. The market for electrical equipment is fair. One item in this field that is active, however, is direct-connected machine tools, manufacturers finding it difficult to keep pace with their orders. Special machinery of various kinds is also picking up, the result of numerous industrial projects in this territory. Wood-working and flour milling equipment are selling well. Cotton trade conditions are good, and this is making for improved business all through the South.

The Louisville board of trade has information regarding the location of an aeroplane factory in this city.

J. Pinkney Varble, Louisville, is representing Pittsburgh interests which are planning the establishment of a barbed wire factory in this vicinity.

The Roy C. Whayne Supply Company, Lincoln Building, Louisville, is in the market for a portable air compressor, operated by a gasoline or oil engine, with a capacity of 150 cu. ft. per minute, and for a standard-gage locomotive crane, 7 to 12 tons capacity, with 30 to 50-ft. beam, second-hand.

C. H. Lambert, Louisville, former president of the Hercules Motor Car Company, New Albany, Ind., is reported to have plans for putting the company's factory in operation again. It lately has been turned over to the bondholders.

The Sheridan Crane Automobile & Signal Company, Denver, Col., is reported to have plans for the establishment of a factory in Louisville.

The Premier Motor Mfg. Company, Indianapolis, Ind., may locate a plant in Louisville, according to advice received by the local commercial club.

The Sure Grip Fire Hydrant Wrench Company, Paducah, Ky., has advised that it is preparing to contract with manufacturers of drop forgings for the production of its patented specialty.

The American Metallic Packing Company, Lexington, Ky., is in the market for a second-hand 200-ton wheel and axle press.

The Pearsite Company, Caney, Ky., which has installed the first unit of its plant for the manufacture of dyestuffs, will proceed to build another, and plans a total capacity of 10,000 lb. per day. H. P. Bope of the Carnegie Steel Company, Pittsburgh, is president of the company.

The Centralia Creamery Company, Centralia, Ill., will establish a branch at Paducah, Ky., and will be in the market for refrigerating and other special equipment. D. M. Farris is in charge.

W. S. Ireland, Owensboro, Ky., formerly manager of the plant of the Universal Stenotype Company, has announced plans by the National Shorthand Machine Company, of which he is president, for the establishment of a factory in St. Louis, Mo.

Lonsdale, a suburb of Knoxville, Tenn., will vote Oct. 30 on a \$30,000 bond issue for a water system.

The Hice Mfg. Company, Johnson City, Tenn., has increased its capital stock to \$60,000 and will install additional equipment during the next twelve months.

The Illinois Central Railroad Company is completing plans for a steel structure, 176 x 1200 ft., at Nonconnah, Tenn., to be equipped for car repairing. A. S. Baldwin, Chicago, is chief engineer.

The Cumberland Springs Company, Tullahoma, Tenn., will install an electric light plant and make other improvements. E. M. Riddle is president.

The Mascot Stove Mfg. Company, Dalton, Ga., will increase its capital stock to \$50,000 and establish a plant at Chattanooga, Tenn. J. F. James is president and treasurer.

The Valley Cotton Mills, Shelbyville, Tenn., will equip a building at a cost of \$50,000. Motors will be used. G. R. Adams, Chattanooga, Tenn., is at the head of the company.

The Elk Cotton Mills, Fayetteville, Tenn., will build an addition at a cost of \$40,000. The special equipment has been purchased, but power machinery remains to be contracted for.

The Stovall-Gillespie Motor Company, 249 Monroe Avenue, Memphis, Tenn., is equipping a garage and automobile repair shop. C. H. Stovall can be addressed.

A machine shop, for the repair of automobiles used in the fire department, will be established by the city of Chattanooga, Tenn. Address Commissioner Betterton.

The Crainesville Gin Company, Crainesville, Tenn., will

purchase power equipment for its new plant. J. B. Davis and W. S. Webb are in charge.

The Ford Motor Company has begun the erection of a three-story building, 75 x 170 ft., at Twelfth Avenue and Broadway, Nashville, Tenn., for use in assembling automobiles. Considerable equipment, to be purchased at the Detroit offices, will be required.

The Hattiesburg Wood Reduction Company, Hattiesburg, Miss., has decided to issue \$25,000 of bonds and \$28,000 of stock for the purpose of enlarging its plant. Turpentine, rosin and other products are manufactured. P. M. Ikeler is president and manager.

The Hardie-Tynes Mfg. Company, Birmingham, Ala., is in the market for a simple or semi-automatic screw machine for rapidly machining small shells 1½ in. in diameter and 4½ in. long. A second-hand machine in good condition will be considered.

Jacob C. Pugh & Co., Norfolk, Va., is in the market for a second-hand engine screw-cutting lathe with an 8-ft. bed and a swing of 16 to 24 in.

Ross R. Thomas, Thomas, Ala., has leased the municipal electric light plant and will purchase two transformers and other equipment.

Birmingham

BIRMINGHAM, ALA., Sept. 27, 1915.

Wholesale machinery dealers report a continuous improvement in the demand for practically all manner of engines, boilers, pumps, machine tools, electrical equipment, etc. The sawmill trade has been an especially active purchaser. Ensilage cutters are on the rapidly moving list along with gasoline engines. Dealers feel confident of the future since fair prices for cotton have been assured. Phenomenal activity at steel and iron plants has also stimulated conditions.

The Stone & Webster Engineering Corporation, Boston, Mass., was successful bidder for the building of the terminal plant of the Mobile Terminal Transfer-Storage Company, Mobile, Ala., which will cost \$1,000,000. Wharves, tracks, warehouses, cranes, etc., are included in the estimates.

Joseph Rea and associates will establish a planing mill at Attalla, Ala.

Toccoa, Ga., will build a power plant on Toccoa Creek.

The Columbia Kaolin & Aluminum Company, which has been organized with a capital stock of \$600,000 by Charles D. Cugle, Fred S. Swindell, Joseph N. Thompson, Commercial National Bank Building, Washington, D. C., and others, has acquired 4000 acres of kaolin property in Wilkinson County, Ga., and plans to install washing machinery, drying apparatus, etc., at a cost of \$80,000.

The Southern Cotton Oil Company, Fort McPherson, Ga., will rebuild its burned mill at a cost of \$75,000.

D. J. Meador, Athens, Ga., contemplates establishing a foundry.

The Rome Truck-Scales Mfg. Company, Rome, Ga., has been incorporated with a capital stock of \$100,000 and will manufacture trucks and scales. George S. Peck, J. McSwain Woods and J. Earle Williams, all of Atlanta, Ga., are among the incorporators.

The Seminole Phosphate Company, Mulberry, Fla., capitalized at \$50,000, will build a plant at Croom, with a daily capacity of 200 tons. W. E. Walker, Mulberry, is president.

Texas

AUSTIN, TEX., Sept. 25, 1915.

No change of moment has occurred in the machinery and tool trade the past week. Business continues to show improvement, due to the increased volume of crop movements. The larger cities of the State, through their respective commercial bodies, are making special efforts at this time to secure new manufacturing enterprises.

The Llano Motor Company, Llano, which has been organized with a capital stock of \$50,000, will manufacture combustion engines. M. D. Slator is in charge.

The Henrietta Window Glass Company has awarded the contract for constructing its window glass manufacturing plant at Henrietta to Austin Brothers, Dallas.

The Atlanta Electric & Ice Company, Atlanta, has taken over and will operate for five years the municipal waterworks plant. It will add equipment to its electric light and power plant and waterworks system.

Andrew C. Hall, Lake Valley, N. M., will install a plumbing plant near that place.

G. L. Truitt, Hagerman, N. M., plans to install an irrigation pumping plant.

Earle C. Cleveland, Mogollon, N. M., will build an electric power plant of 1500 hp. capacity.

H. A. Frankenstein and associates will build a plant at Dallas for the manufacture of reinforced concrete pipes. It will be equipped with hoisting cranes and five curing vats. They will also build a duplicate plant at Houston.

Roy Campbell, San Antonio, has approved the plans for a precooling plant which he will build at San Benito. It will have a capacity of nine carloads of vegetables.

The electric light plant and cotton gin of T. J. Vines & Sons, Celeste, recently destroyed by fire with a loss of \$15,000, will be rebuilt.

St. Louis

St. Louis, Mo., Sept. 27, 1915.

Machine tool inquiry the past week has been somewhat better, although still confined largely to single tools. The inquiry has been broad and general. All reports now are of fundamentally better conditions with indication of decided activity this winter. Crop reports are excellent. Even cotton is approximately worth double what it was a year ago and steadily rising. Banking conditions are good with money in ample supply.

The Fulton Iron Works, St. Louis, Mo., is reported as inquiring for a list of machine tools, among which are included twelve geared head engine lathes, ranging from 14 in. to 24 in.; two shaping machines; a spiral gear hobber to take gears up to 30 and 36 in.; 54-in. special boring mill with revolving head; 30-in. vertical turret lathe; 4-in. and 6-in. radial drills; three sensitive drilling machines; two flat turret lathes; internal grinding machine; horizontal drilling and boring machine, and a gas fired hardening furnace with electric pyrometer.

The Hannibal Wire Fabric Company, Hannibal, Mo., will build a factory, including an annealing oven and paint tower, 140 x 300 and 50 x 150 ft., costing \$125,000.

The Mercury Mfg. Company, St. Louis, Mo., has been incorporated with a capital stock of \$50,000 by J. O. V. Stettin, H. L. Bonhoff and Arthur C. Eckert to manufacture laundry machinery, etc.

The Instantan Water Heater Company, St. Louis, Mo., has been incorporated with a capital stock of \$100,000 by Andrew O. Schrader, John H. Wagner and others.

The Adams Automobile & Supply Company, Chillicothe, Mo., has increased its capital by \$25,000 to enlarge its repair and machine shop.

The Campbell Electric Light & Power Company, Campbell, Mo., is in the market for about \$30,000 worth of equipment. R. C. Jones, B. F. Eichols and W. E. Glenn are stockholders.

An electric plant requiring about \$8,000 of generating and power machinery is to be equipped at Drexel, Mo. A. Mitchell, the mayor, is in charge.

The commissioner of waterworks of Benton, Ark., will receive bids until Sept. 28 for two 100-hp. boilers, 200-hp. heater, feed pump, two 500-gal.-per-minute steam pumps, three 300-gal. centrifugal pumps, 90-hp. engine, 60-kva. generator.

A tile manufactory to cost about \$100,000 is to be equipped at Hafer, Ark., by E. M. Hafer, Bloomington, Ill.

A Portland cement plant of undetermined capacity is to be equipped at Foreman, Ark., by the Consumers Portland Cement Company, Chicago, Ill. C. B. Aydelotte, Foreman, or the Fuller Engineering Company, Allentown, Pa., may be addressed.

Beankenship & Sullivan, Rye, Ark., will add equipment to their lumber, plant including a circular saw, lathe and other machinery, including planing mill of 30,000 ft. daily capacity.

The planing mill of the A. M. Ferguson Lumber Company, Fort Smith, Ark., which has been burned with a loss of \$7,500, will be replaced.

The Little Rock College, Little Rock, Ark., H. A. Heagney president, will equip an engineering building, machine shop, foundry, etc., and is seeking machinery. F. M. Blaisdell, Bankers' Trust Building, Little Rock, Ark., may also be addressed.

Muskogee, Okla., will expend \$350,000 on equipment for obtaining, pumping and distributing natural gas in Muskogee for manufacturing use.

The Davidson Mill & Elevator Company, Muskogee, Okla., will rebuild and re-equip its burned elevator plant at a cost of \$50,000.

The Triumph Valve Mfg. Company, Oklahoma City, Okla.,

has been incorporated with a capital stock of \$16,000 by William Grandsden, C. H. Lindley and others.

A garage and machine shop at Frederick, Okla., will be equipped by Walker & Phipps.

The Negro A. & M. College's mechanical building at Langston, Okla., including also the light plant and powerhouse, has been burned with a loss on equipment of \$25,000. It will be replaced. J. G. Ralls is chairman of the board.

The Electric Light & Mfg. Company, Prentiss, Miss., will install an oil-burning engine and other machinery. W. C. Veach is engineer in charge.

The Tallahalla Lumber Company, Ora, Miss., will equip a new lumber mill of 150,000 ft. daily capacity, near Ellenville, Miss.

The Hopkins Brothers Company, Lafayette, La., has been incorporated with \$12,000 capital stock by F. K. T. B. and O. H. Hopkins and will equip a lumber mill.

The Fairchild Auto Company, New Orleans, La., will enlarge its quarters and install additional repair shop machinery.

Shreveport, La., has plans for the expenditure of \$1,200,000 on waterworks, sewage disposal and other equipment. Address the mayor.

The Big Pine Lumber Company's power plant at Colfax, La., has been burned. It will be replaced, new equipment being wanted at once.

The Pacific Coast

SEATTLE, WASH., Sept. 21, 1915.

Shipments of all kinds of mining and miscellaneous machinery to Alaska continue exceedingly heavy. Aside from the large shipments being sent by the Alaska Engineering Commission, the private orders for hydraulic and other mining equipment are unusually large. Repair work in machinery lines continues brisk. Many plants are now being overhauled and put in condition to start operating in the late fall.

The Tacoma Smelting & Refining Company, Tacoma, Wash., has awarded to Cornell Brothers, Tacoma, contract for construction of four steel buildings, known as the powder house, reverberatory, roaster and casting furnace buildings. This construction is a portion of the \$1,500,000 worth of improvements to be made.

It is reported that the Puget Sound Iron & Steel Company, Tacoma, Wash., is to receive contract for manufacturing \$1,000,000 worth of shrapnel.

Articles of incorporation have been filed for the Farmers Pump Company, Vancouver, Wash., capitalized for \$32,000. F. M. Lockwood and R. C. Sugg, the incorporators, are also first trustees.

H. M. Squires, Gresham, Ore., plans to construct a fireworks factory to cost \$40,000.

The sawmill in Forest Grove, Ore., owned by J. C. Callahan, has been destroyed by fire, with a loss to the mill and machinery of \$17,000.

The plant and properties of the Stayton Electric Light Company, Stayton, Ore., have been purchased by C. E. Taylor of that city. The new owner plans improvements to the plant.

The steam auxiliary pumping plant of the Bend Water, Light & Power Company, Bend, Ore., which was destroyed by fire recently, will be rebuilt at once. T. H. Foley is manager.

Extensions to cost more than \$100,000 are to be made to the Seattle branch of the Ford Motor Company.

A spray plant will be erected in Hood River, Ore., by the Oregon Arsenical Spray Company, Clackamas, Ore. A site, 100 x 180 ft., has been purchased for the plant. J. C. Butcher is president.

The Clements Mfg. Company, manufacturer of hand power and electric vacuum cleaning plants, contemplates the erection of a branch plant in Pendleton, Ore. A. S. Kedzie is manager.

The Smoked Salmon Canning Company, Seattle, has been incorporated for \$50,000 by Paul Behrens, Hans Heldner and R. A. Hulbert. It is understood the company plans to erect a canning plant in this city.

The Rotary Valveless Motor Company, Auburn, Wash., has filed articles of incorporation for \$100,000. J. O. Menard, F. M. Russell and others are the incorporators. It is understood the company plans to erect a small plant to manufacture its device.

Owing to the many new shipbuilding orders received recently, the Seattle Construction & Dry Dock Company, Seattle, plans to increase its force of workmen by about 1500 skilled mechanics and other laborers within the next 30 days.

A. V. Dunkle, Plummer, Idaho, has received franchise from Kendrick, Idaho, to operate an electric light plant there. It is understood the plant will cost about \$10,000.

The Coast Culvert & Flume Company, Portland, Ore., plans addition to its plant costing about \$7,000, including a two-story factory.

It is estimated that within the next four months approximately \$800,000 will be paid out by the Oregon-Washington Railroad & Navigation Company and the Chicago, Milwaukee & St. Paul Railroad in making improvements in the Puget Sound district.

The antimony mine owned by the Lucky Knock Mining Company, Tonasket, Wash., has been sold to John S. Reed, Chicago, who is understood to represent interests in that city. The new owners plan immediate development of the property, owing to the unusual demand for antimony, due to the war.

Grable & Austin, 27 South Raymond Avenue, Pasadena, Cal., have prepared plans for a machine shop for E. R. Braley which will cost \$11,000.

The Nevada County Narrow Gauge Railway Company, Grass Valley, Cal., will rebuild its machine shops and roundhouse recently damaged by fire.

The California Iron Works, Riverside, Cal., will build a foundry and machine shop. Frederick Stubbler is manager.

The Beardsley Electric Company will build a plant at Culver City, Cal., near Los Angeles. It manufactures electric automobiles.

The Marchant Calculating Machine Company, 800 Syndicate Building, Oakland, Cal., has started the construction of the first unit of its plant. Three units are to be erected to cost about \$60,000 and \$200,000 worth of equipment, etc., will be required.

Canada

TORONTO, Sept. 25, 1915.

The Steel Company of Canada, Hamilton, Ont., has completed an addition to its plant, increasing the capacity for steel forgings 50 per cent.

The Hansen Grain Company, Ltd., Winnipeg, has been incorporated with a capital stock of \$50,000 by Axel Hansen, Gustaf Lorin, Sydney J. Masters, and others, to erect and operate grain elevators, warehouses, etc.

The Metro Pictures, Ltd., Montreal, has been incorporated with a capital stock of \$50,000 by Rupert G. Sharp, Herbert Lubin, Arthur Ecrement, and others, to manufacture films, motion picture machines, etc.

The Edmonton Power Company, Ltd., Montreal, has been incorporated with a capital stock of \$100,000 by Aubrey H. Elder, Patrick F. Brown, Burton F. Bowler and others.

The Western Timber Corporation, Ltd., Kamloops, British Columbia, has been incorporated with a capital stock of \$100,000 by James C. Shields, David W. Rowlands, George T. Withington, and others, to manufacture lumber, etc.

The Gowland Optical Company, Ltd., Montreal, has been incorporated with a capital stock of \$1,000,000 by Joseph A. Ewing, George S. McFadden, Richard B. Proctor, and others, to manufacture scientific instruments, lenses, etc.

The Fairbairn Cooke, Ltd., Toronto, has been incorporated with a capital stock of \$75,000 by William H. Cooke, Robert S. Deacon, 6 Adelaide Street East, Garnet A. Archibald, and others, to manufacture electrical appliances, motor cycles, munitions of war, etc.

The Automatic Valve Company of Canada, Ltd., Calgary, has been incorporated with a capital stock of \$20,000 by Francis W. Griffiths, Leo H. Miller, C. M. Right, and others, to manufacture valves, brass, copper, etc.

The Nicholson Lumber Company, Ltd., Burlington, Ont., has been incorporated with a capital stock of \$25,000 by Allan S. Nicholson, Samuel A. Dearing, Elwood C. Peart and others.

The Noel-MacKay Lumber Company, Ltd., Fort Francis, Ont., has been incorporated with a capital stock of \$100,000 by Peter J. Noel, John J. MacKay, Arthur D. George, and others, to manufacture lumber, etc.

The Elkhorn Lime Company, Ltd., Madoc, Ont., has been incorporated with a capital stock of \$250,000 by William P. Gillespie, McKinnon Building, James Skelton, 70 Lawton Avenue, and others, to manufacture lime.

The Golden West Milling Company, Conaught Block,

Saskatoon, Sask., has been incorporated with a capital stock of \$50,000 by H. W. Pare, president; C. T. M. Wakefield, managing director; C. M. Smith, secretary, and others. It will install an up-to-date flour and grist mill in each district of Saskatoon not already provided with such plants.

George Rivers, Strathroy, Ont., is in the market for a veneer machine, 66-in. knife, basket machinery, etc.

The Marine City Sugar Company, Petrolia, Ont., is contemplating establishing a plant, which will cost about \$800,000. E. Hyatt, Petrolia, is a stockholder.

The Canadian Linen Fibre Company, Edmonton, Alberta, is contemplating the erection of a plant, 35 x 125 ft., at Rosetown, Sask., to cost \$125,000. About 40 hands will be employed at the start.

Gustave Pollien, Montreal, is contemplating the erection of a plant for the manufacture of aeroplanes, etc.

The Mount Royal Color & Varnish Company, 195 Dorchester Street, Montreal, will build a factory there.

Pilkington Bros., Montreal, has received a permit for the erection of a new factory.

The Brantford Cordage Company, Brantford, Ont., will build an addition to its factory. C. L. Messecar is manager.

Daley & Carvell, St. John, N. B., has purchased a site of 20 acres at Washademoak, N. B., and will build a factory for the manufacture of axes, etc.

Edward Ramage, shipbuilder, 29 St. Joseph Street, Toronto, is in the market for rotary bevel shears and a punching machine to punch 1-in. holes in 1-in. plate.

The Alberta Flour Mills, Calgary, Alberta, recently incorporated with a capital stock of \$5,000,000 is contemplating the erection of a large flour mill there. Arthur T. Seyler, Thomas M. Ovens, and others, are interested in the undertaking.

Extensions to cost \$16,000 will be made to the waterworks plant and a new high pressure waterworks system will be installed at Owen Sound, Ont., to cost \$7,000. Charles Gordon is city clerk.

Berlin, Ont., passed a by-law to provide \$65,000 for the construction of a sewage disposal plant.

P. H. Renaud, Agnes Street, Lake Megantic, Que., will build a pulp mill to replace one destroyed by fire and will purchase new machinery to be installed next April.

East Angus, Que., will make extensions to its waterworks plant to cost \$5,000. R. C. Cowling is clerk.

The Reliance Harness Works, Ltd., Toronto, Ont., has been incorporated with a capital stock of \$40,000 by Harry St. J. Jarvis, Dominion Bank Building, Toronto; Arthur H. Davies, and others, to manufacture leather goods, etc.

The Canadian Autopower, Ltd., Toronto, Ont., has been incorporated with a capital stock of \$40,000 by Robert F. Angus, 77 York Street, Toronto; Harold Wilson, John R. Robertson, and others, to manufacture machinery, tools, implements, etc.

Howat & Harcourt, Ltd., Toronto, Ont., has been incorporated with a capital stock of \$100,000 by Thomas F. Harcourt, Royal Bank Building, Toronto; J. S. Howat, and others, to build and operate flour mills, elevators, etc.

The Quebec Ammunition Company, Ltd., Montreal, Que., has been incorporated with a capital stock of \$49,000 by Howard Murray, R. T. Heneker, and others, to manufacture ammunitions, guns, etc.

Oshawa, Ont., has passed a by-law giving the company in which David Maxwell, room 704, Traders Bank Building, Toronto, is interested, the right to locate there, and to guarantee the mortgage bonds of the company to the extent of \$60,000; and as soon as \$350,000 has been expended on a plant to give the deed for the 140-acre site, on which the plant will be erected, to the company. The company will build a steel car works and rolling mill to cost \$350,000 and to employ 250 men. The plant must be finished by 1916.

Leek & Co., Ltd., Vancouver, B. C., has been incorporated with a capital stock of \$100,000 to manufacture machinery, tools, etc.

The Mainland Cedar Company, Ltd., Vancouver, B. C., has been incorporated with a capital stock of \$100,000 to manufacture lumber, etc.

Bids are being received by F. P. Adams, city engineer, Chatham, Ont., for machinery and equipment for the Chatham electric light plant, gas engines, producers and electric generators, etc.

The Muskoka Lakes Corporation, Gravenhurst, Ont., is contemplating installing a number of small steam pumps at various points for fire protection. W. F. Wasley of the Muskoka Navigation Company is manager.

NEW TRADE PUBLICATIONS

Drag Line Excavators.—Monighan Machine Company, 2016 Carroll Avenue, Chicago, Ill. Catalog No. 15. Gives general descriptions and specifications for a series of drag line excavators that are furnished either with or without traction apparatus. Brief descriptions of the various styles of excavators are presented, but the catalog for the most part is given over to illustrations of the excavators in use.

Lifting Trucks.—The Stuebing Truck Company, 308 Walnut Street, Cincinnati, Ohio. Booklet entitled "System in Trucking." Contains information of interest to manufacturing plants of all kinds where much trucking is done, also gives table of saving effected in the use of the Stuebing all-metal lift-truck, which is made in two general styles.

Electrical Apparatus.—The Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa. Leaflets Nos. 3805, 3806 and 3807, describing the application of automatic control apparatus to cranes and steel mills. They show the scheme of main connections and describe the method of operation of the magnetic unit switches, as arranged for the service of steel mill practice.

Wire Rope.—Wright Wire Company, Worcester, Mass. Catalog and price list. Refers to a line of wire rope for all purposes. After giving instructions on the ordering of wire rope and a list of points to be remembered concerning it and its use, cross-sectional drawings of the various standard methods of construction of wire rope for general use are presented with brief descriptions of how the ropes are made and the purposes for which they are used. In connection with these diagrams reference is made to the pages in the catalog on which the sizes of rope are tabulated together with various dimensions. The ropes listed include transmission, haulage, standing, hoisting, tiller, hawser, rigging, guy and arc light rope, sash cord and drilling lines. A table showing the power that can be transmitted by wire rope is included, together with suggestions on the proper method of installing a transmission system. Illustrated directions for splicing wire rope are given and mention is made of the various accessories used, such as thimbles, sockets, sheaves, etc.

Turret Lathes.—Gisholt Machine Company, Madison, Wis. Catalog J-7. Deals with a line of turret lathes for the boring, turning and facing of castings, forgings and large bar stock. A general description of the standard lathe is presented followed by illustrations, brief descriptions and condensed specification tables of the belt and motor driven machines and the various standard boring, turning and bar tools, facing heads and accessories that are used. A number of pages are given to illustrations of the performing of various operations on these lathes and of parts that have been finished on them. The evolution of the lathe from 1885 up to the present time is traced by a series of photographs and a dimension table and diagram are included. Mention is also made of a universal tool grinding machine.

Projectile Presses.—Hydraulic Press Mfg. Company, Mount Gilead, Ohio. Bulletins Nos. 5002 and 5003. The first covers a line of hydraulic forging and drawing presses designed for the billet piercing and drawing operations necessary in producing steel shells. An illustration of the press is presented, together with a brief description of the way in which it works. The second bulletin covers presses for performing the nosing and banding operations which are the third and fourth in the production of projectiles. A brief description of the way in which the operations are performed is presented and the text is supplemented by illustrations of presses for both operations.

Foundry Facings.—Hill & Griffith Company, Cincinnati, Ohio. Pamphlet entitled, "Foundry Philosophy." Relates to a line of foundry facings and supplies which includes chaplets, core compound, plumbago, facings and partings. In connection with the mention of the various supplies, brief instructions regarding their use are included. Mention is also made of a line of polishing and plating supplies.

Fireproof Floors and Partitions.—Trussed Concrete Steel Company, Youngstown, Ohio. Two pamphlets. The first describes the construction of fireproof floor and bearing partitions by the use of pressed steel beams and joints in connection with expanded metal. A number of views of the various building members than can be supplied are presented, together with illustrations of details of construction and a number of photographs of the material in actual use. Specifications for the use of this material in floors, partitions, roofs, ceilings, etc., are included and drawings of the various beams and studs that can be regularly supplied are also presented. The other pamphlet gives information on the use of Kahn mesh for reinforcing concrete for floors, roofs, roads, sewers,

tanks, walls, culverts, bridges, etc. The various systems of floor construction are illustrated and described and a number of tables giving the safe live load in pounds per square foot that can be supported by this mesh for various spans are included. Mention is made of the tests that were made on this mesh reinforcement at New York City and illustrations of the mesh in use for various purposes are shown.

Apparatus for Determining Critical Points.—Scientific Materials Company, Pittsburgh, Pa. Pamphlet. Deals with the apparatus by which the critical points in iron, steel and alloys are determined. After a brief description of the importance of the determination and study of the critical points of metals, instructions on the things to be considered in accurate critical point work are presented. This is followed by a description of the Schmitz method of determining the critical points of metals in their solid state and the various pieces of apparatus employed, together with instructions for their use.

Babbitt Metals.—Lumen Bearing Company, Buffalo, N. Y. Booklet. Refers to a general line of babbitt metals which are made in a number of different brands. Each of the various brands is listed and a brief description given of its composition and the work that it is designed to do. Mention is also made of a line of bar solder and of another line that has been developed especially for soldering aluminum.

Oil Engines.—De La Vergne Machine Company, Foot of East 138th Street, New York City. Bulletin No. 142. Illustrates and describes the type DH engine which is built with single and twin cylinders. This engine is of the single-acting type and operates on the four-stroke cycle. The description is quite complete and the text is supplemented by numerous engravings of the various parts. Curves showing the comparative fuel cost of various types of engines and the economy that is secured in the operation of this engine are included together with a set of dimension tables and diagrams.

Water Meters.—Alberger Pump & Condenser Company, New York City. Bulletin No. 20. Illustrates and describes the Hammond line of meters for measuring water or other liquids by the alternate filling and emptying of tanks of known capacity and recording the number of trips. The construction and operation of the meter is gone into at some length, the text being supplemented by a number of line and halftone engravings and reproductions of charts that have been obtained with the meter. Instructions on the installation of the meter are presented and a number of diagrams of suggestive methods and tables of capacities, weights and dimensions are included.

Milling Machines.—Carter & Hakes Machine Company, Winsted, Conn. Catalog No. 3. Gives general description and specifications for a line of milling machines of the hand and power types which are designed for use on the floor or on benches. For the most part, a pair of facing pages is devoted to each machine, with an engraving on one and a description or table of specifications on the other. Mention is made of an automatic quick return for the table of the company's Lincoln type machines and illustrations are presented of accessories such as plain and half universal index centers and screw vises.

Galvanizing Equipment.—Meaker Company, 1243 Fulton Street, Chicago, Ill. Pamphlet. Devoted to the line of equipment that can be supplied for cleaning work and galvanizing it. This includes still galvanizing equipment operated by hand, an automatic continuous galvanizing machine and an intermittent galvanizing barrel as well as dynamometer electrical instruments and other accessories such as tanks, copper rods, anodes, etc. The various forms of galvanizing equipment are illustrated and described at some length, and instructions for their operation are included.

Heating and Ventilating Fans.—American Blower Company, Detroit, Mich. Pamphlet. Gives an account of numerous installations of Sirocco fans for heating and ventilating and conveying materials in industrial plants. The uses to which these fans are put include the ventilation of auditoriums, mines and industrial plants of all kinds.

Crucibles.—Joseph Dixon Crucible Company, Jersey City, N. J. Card hanger. Gives a number of hints on the things that should and should not be done to increase the number of heats that can be obtained from a crucible, the principal points being underscored in a contrasting color. On the back of the card is a table of the melting points of the various metals in both Centigrade and Fahrenheit scales and illustrations of graphite foundry accessories such as phosphorizers, mufflers, dippers and stirrers are presented.

Steam Pipe Insulation.—Robert A. Kearsbey Company, 100 North Moore Street, New York City. Folder. Points out the advantages of using Ric-Wil vitrified tile conduit with interlocking base drain for covering underground steam pipes. A diagram showing the use of this system is included together with several illustrations of actual installations.

of
per
not
are
on
ous

et.
on,
ion
the
be
ed.
of
ate
ith

X.
ich
ari-
om-
n is
has

t of
us-
with
ting
ion
ous
om-
omy
ided

any.
ibes
ther
s of
econ-
ome
and
have
alla-
rams
and

any.
and
and
or of
voted
scrip-
made
any
d of
e and

Fol
ne o
gal
oper
chine
amoc
ranks
nizing
a, and

flowe
ant o
vun
The
ion o

Cit
thine
ber o
incipi
e has
varies
illu
espho

mpar
Pul
it w
a pip
ted t
A